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Tropical Vegetables

by G.J.A. Terra

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# TROPICAL VEGETABLES

VEGETABLE GROWING IN THE  
TROPICS AND SUBTROPICS  
ESPECIALLY OF INDIGENOUS VEGETABLES

*by*

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DIRECTOR NEDERF

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## CONTENTS

Foreword	VII
I. Introduction	I
II. The culture	5
A. Commercial cultures and separate cultures for home consumption	7
Choice of site	8
Tillage and manuring	9
Seedbeds	12
Maintenance	13
Choice of plants	14
B. Mixed gardens or compounds or home gardens	14
III. Enumeration of vegetables	18
A. The principal cultivated or much used tropical vegetables	18
B. Other plants producing edible young leaves or shoots	86
C. Palms for palm cabbages	101
D. Ferns and related plants	103
<i>References</i>	105

## LIST OF ILLUSTRATIONS

	page
1. <i>Abelmoschus manihot</i> Med.	17
2. <i>Alocasia macrorrhiza</i> Schott., <i>Xanthosoma violaceum</i> Schott., <i>Colocasia esculenta</i> Schott., <i>Colocasia gigantea</i> Hook. f. (tubers).	21
3. <i>Alocasia macrorrhiza</i> Schott., <i>Xanthosoma violaceum</i> Schott., <i>Colocasia esculenta</i> Schott. <i>Colocasia gigantea</i> Hook. f., (leaves).	22
4. <i>Amaranthus hybridus</i> L.	24
5. <i>Basella rubra</i> L.	28
6. <i>Corchorus olitorius</i> L.	40
7. <i>Euphorbia pulcherrima</i> Willd.	47
8. <i>Gnetum gnemon</i> L.	48
9. <i>Hibiscus esculentus</i> L.	51
10. <i>Ipomoea reptans</i> Poir.	53
11. <i>Leucaena glauca</i> Benth.	55
12. <i>Manihot utilisima</i> Pohl.	58
13. <i>Momordica charantia</i> L.	60
14. <i>Moringa oleifera</i> Lam.	62
15. <i>Psophocarpus tetragonolobus</i> A. DC	69
16. <i>Sauropus androgynus</i> Merr.	72
17. <i>Sechium edule</i> Sw.	74
18. <i>Talinum triangulare</i> Willd.	78
19. <i>Vigna unguiculata</i> Walp.	81

The numbers 1, 5, 7, 8, 9 are from OCHSE, J. J.: Indische Groenten; 4, 10, 11, 12, 13, 14, 15, 16, 17, 18 from OCHSE, J. J.: Tropische Groenten; 2 and 3 from SOEPARMA, S.: Indonesische Groenten; 6 from BOIS, D.: Les plantes alimentaires chez tous les peuples; 19 from HERKLOTS, C. A. C.: Vegetable cultivation in Hongkong.

NOTE: Nomenclature is used to the best of our knowledge without extensive botanical verification.

## FOREWORD

It gives me great pleasure to introduce our communication no. 54e on tropical vegetables, which is published by the Department of Agricultural Research of the Royal Tropical Institute jointly with the Foundation "Netherlands Organization for International Assistance" (NOVIB). This co-operation is a natural one: both our organizations have a common interest in the contents of this volume, which indicates a practical remedy against a dangerous situation existing in many tropical countries, a situation which too often is not yet understood by the local population itself.

The volume does this by presenting numerous data on locally available sources for improving the diet and by recommending and describing methods that are not beyond the capacity of the rural population.

This publication in English will be followed by a French (and possibly also a Spanish) version.

The importance of green vegetables in the diet for vitamin supply, especially of vitamin A, is well-known, particularly for the arid regions. Nowadays, their importance for improving the protein content of the diet also deserves great consideration.

In most publications of this type the imported temperate vegetables dominate. Here, on the contrary, it is tried to stress information on original vegetables of equatorial and subtropical regions. These are more adapted to local soil and climate: leached soils, humidity, temperature, daylength, etc., and therefore they can be grown more easily and more cheaply. Moreover, propagation is fairly easy. They offer vast resources for further selection, which has been insufficient until now. Many of them are only found in the wild or half-wild state. They are only locally grown or even locally known as vegetables, and sources of information are few and far between.

The author, Professor Ir. G. J. A. TERRA, is an expert in tropical horticulture. After twenty years of experience as a Head of Horticulture in pre-war Indonesia he gathered data and experience in several other tropical regions, lately as the Director of the "Netherlands Foundation for designing and executing the Home Gardens Project" (NEDERF), operating

in Western Africa and fostered by NOVIB and FAO/Freedom from Hunger Campaign.

It stands to reason that this volume is not meant to serve as reading matter for entertainment. But it does furnish much valuable information in a concise and surveyable way, thus allowing for quick application. It is an example of what was meant in the introduction to one of our former publications by pointing out that not only ultra-modern sophisticated western scientific methods and equipment would have the monopoly for solving the problems at hand: "A wealth of experience, both old and new, is readily available for application in vast areas which both figuratively and literally still lie fallow".

We assume that this publication will be a valuable guide to extension workers in the field of practical horticulture and nutrition, and in this way play its modest role in tackling the urgent task of our present days: Narrowing the existing gap between knowledge and its application in developing countries.

DR. R. BRINK  
Director,  
Department of Agricultural Research,  
Royal Tropical Institute

Amsterdam, October 1966

## I. INTRODUCTION

Vegetables and fruits are those fresh and juicy parts of plants, which are eaten as a supplementary food, as a side dish or simply by themselves. Fruits may be distinguished, since they are real botanical fruits, eaten as such, as well as prepared and preserved, mostly in their mature stage, for their agreeable, sweet, acid or aromatic flavour. They may include various nuts, which are not juicy. Vegetables are the other components of this group, mostly eaten prepared in some way or other, but sometimes used as such in the fresh, raw state, particularly leaves.

Vegetables are specially important as a supplementary nutrition, in addition to the main food. The latter, which usually consists of cereals, farinaceous foods or tubers, must furnish the necessary energy (calories) and also the proteins, inasmuch as these are not obtained from meat, fish, eggs, milk or cheese. The vegetables then supply a large part of the necessary vitamins and minerals and often supplementary proteins as well. Usually, the vitamins and minerals are the most important contribution from the vegetables, but where the main food has a poor protein content e.g. if it consists of tubers without meat, fish etc., the protein supply from vegetables can be considerable. In regions, where the principal food consists of cereals, the protein content of the vegetables may be less important.

There is no general agreement as to what is meant by vegetables. We may distinguish:

1. Leaf vegetables e.g. spinach, cabbage, corchorus, purslane.
2. Pulse vegetables such as young pulses of beans and other leguminous plants.
3. Fruit vegetables, young or ripe fruits such as pumpkin, gourd and egg plant.
4. Seed vegetables such as young seeds of peas, beans etc.
5. Tuber vegetables e.g. roots, tubers and rhizomes of carrots, sweet potato, beet, radish, turnips, ginger etc.
6. Other vegetables e.g. young flowers, stalks etc. of cauliflower, asparagus, onion and other bulbs.

Vegetables, especially the leaf and pulse varieties, are particularly im-

portant for the supply of vitamins. Above all, they furnish vitamin C and carotene (provitamin A), as well as considerable quantities of the various B vitamins and minerals.

On the whole we may say:

- a. Fresh vegetables, fruits and tubers supply vitamin C and minerals. Vitamin C is not proof against long boiling, i.e. against high temperatures. It is soluble in water. A shortage of it is noxious for everybody (scurvy).
- b. Greens, especially leaf and pulse vegetables, supply important quantities of carotene (provitamin A). Often yellow, orange- and red-coloured vegetables, tubers and fruits contain important quantities of it, but a red or blue colour (as in beet, red cabbage) need not indicate carotene. Blanched vegetables always contain less carotene than green ones. Carotene can stand high temperatures reasonably well, vitamin A cannot. Both are soluble in fat (red palm oil e.g.). A shortage of this vitamin may cause night-blindness and, particularly in children, blindness (xerophthalmia, keratomalacia).
- c. Vegetables, especially those of the pulse, leaf and (both ripe and young) seed varieties supply large quantities of the various B vitamins. They are proof against boiling, but B<sub>2</sub> cannot stand direct sunlight. They are soluble in water. A shortage of them causes a.o. beri-beri (B<sub>1</sub>) and pellagra (B complex).

Moreover, many vegetables e.g. young leaves of cassava and of trees and shrubs such as *Poinsettia*, *Gnetum* and *Moringa*, and also pulses and their young seeds, contain from 4 to 10% of protein of the fresh weight. These vegetables are of particular importance for the supplementary supply of proteins.

Ordinary leaf vegetables mostly have only 1-2% of proteins, just like many tubers and usually the protein content of fruits is still lower. Shortage of protein may cause kwashiorkor in young children and death may follow soon.

Most vegetables are annual plants. But in the tropics, young leaves, shoots, pods and other fruits are often harvested from shrubs and trees. Their great advantage is the fact that they often continue to grow and yield in the dry period, when the growing of annual vegetables meets with difficulties.

In addition to greens, also fruits and tubers are desirable. Fruits contain minerals and vitamin C, and the coloured ones often carotene. They offer an agreeable change from the normal food and stimulate the appetite by their various vegetable acids and aromatic components. Most of the tubers contain mainly starch; in the first place, they supply energy (calories), but they may also have many vitamins (carotene and minerals). They offer a suitable alternative for cereals and other starchy foods, which are mostly poor in minerals.

An idea of the greater value which greens, young pulses and young

seeds have for our diet than any other vegetables, tubers and fruits, is given by the following table. All data refer to 100 grams of fresh weight.

Vegetables	Cal.	Protein in g	Vitamin A in IU	Vitamin B <sub>1</sub> in mg	Vitamin B <sub>2</sub> in mg	Niacin in mg	Vitamin C in mg
<i>Leaves</i>							
Cassava leaf	53	7	10,000	.14	.26	1.5	300
Tropical spinach	44	4	13,000	.15	.25	.85	100
Kankong *	17	3	4,000	.15	.2	1.6	140
Green vegetables (av.)	22	2.4	5,000	.07	.15	.6	55
Yellow vegetables (av.)	18	1.5	500	.04	.06	.13	31
<i>Pods and seeds</i>							
Beans (pods)	33	2.2	200	.08	.10	.6	13
Asparagus bean (pods)	18	2	1,200	.10	.10	1.1	20
Peas (seeds)	48	3.4	1,500	.28	.12	2.0	10
<i>Young fruits</i>							
Cucumber	10	.6	200	.04	.05	.16	10
Okra or gombo	29	1.8	1,000	.1	.1	.7	25
Tomato	18	1	1,200	.35	.04	.7	25
<i>Tubers</i>							
Cassava (fresh)	131	.7	0	.02	.1	.6	30
Sweet potato (fresh)	121	1.5-2	0-5000	.1	.06	.7	20
Coco-yam (fresh)	88	1.5-2	40	.05	.06	.4	6
<i>Fruits</i>							
Banana	103	1	100-350	.05	.06	.5	10
Papaw	38	.6	2,500	.02	.02	.1	60
Orange	43	.8	250	.08	.03	.2	25
Mango	59	.7	1,000	.06	.05	.2	30
Water melon	26	.5	500	.05	.07	.05	6
Avocado	210	2	200	.1	.15	.1	20

Especially dark green tropical vegetables are rich in proteins and vitamins, also the young pulses and seeds. Fruit vegetables, tubers and fruits are much less important in this respect. The avocado is also rich in vitamins, but when these contents are calculated per 100 calories, they will be seen not to exceed those of other fruits.

An adult person needs 2000 to 3000 calories a day. If one gets these from cheap food, rich in calories but poor in proteins etc., then the supplementary food must consist of products, rich in protein and vitamins e.g. meat and fish. Now this purpose may also be served by those parts of plants which are rich in protein and vitamins, as calculated per 100 calories, e.g. beans and greens. This supplementary food is particularly important for the young and the sick, who cannot ingest large quantities of food. Of course, the need for vegetables depends on the composition of the staple food. If this contains sufficient proteins, the quantities of fresh green vegetables needed per capita may be put at a minimum of 0.1 kg per day, because then the total supply of vitamin C and carotene can be considered safe. Should the vegetables have to take over part of the protein supply,

\* = *Ipomoea reptans* = *I. aquatica* (swamp cabbage or water spinach)

then a quantity up to 0.5 kg may be desirable \*. These quantities are not excessive, for there are regions where more than 0.5 kg of vegetables a day are eaten.

Calculated per annum, this need for vegetables amounts to respectively 40 and 200 kg per head, which means 200 or 1000 kg a year per family. As we shall see later, from 1 to 5 ares will have to be planted for this purpose for each family.

*Methods of preparation.* Though this is not the place to enter into the exact preparation of vegetables, a general description may be very useful.

In Indonesia and also in other tropical countries, it is still customary to collect various wild growing vegetables (young leaves, shoots) and to eat them raw, sometimes with a sauce. This so-called "lalab" can also be used after having been dipped into boiling water for 5-10 minutes. In this manner, the vegetables become softer without losing their consistency. They are then often eaten with a peanut sauce (gado-gado or petjel, Indonesia) or with coconut milk. Mostly people use locally grown vegetables: cabbage, swamp cabbage or water spinach, bean sprouts, asparagus bean, four-angled bean, etc.

In western countries as well, some vegetables are eaten raw, sometimes with a sauce: lettuce, endive, cabbage, radish, cucumber, tomato. Sometimes boiling water is first poured over them (cabbage) for softening.

In primitive regions vegetables are wrapped in banana leaves etc. and baked in hot ashes or between hot stones (Polynesia, New Guinea).

The normal western manner is to boil vegetables in water; often they are then further stewed with fat, milk, flour etc.; mostly they lose their consistency and often also some of their flavour.

The Chinese kitchen stews or fries vegetables with fat; they keep their consistency and are not boiled out.

In Africa vegetables often are stewed with palmoil, e.g. young cassava leaves, and used after passing through a sieve, as infant food.

In many countries vegetables are mixed with the main food and boiled together; hotchpotch, rice with vegetables (riz à la créole), Irish stew etc.

Also thick vegetable soups are much in use; they are eaten separately (minestrone e.g.) or with the main dish (sayer in Indonesia and Thailand) rumasava (Madagascar), the sauce eaten with the couscous (North-Africa). Sometimes a thick soup with rice is used as infant food (nasi tim, Indonesia).

In Africa, especially along the Guinea Coast, it is customary to cook

\* In general, proteins of vegetable origin contain less of the important, sulphur containing amino acids cystine and methionine than animal proteins. Moreover, methionine can be transformed by the human body into cystine but not the reverse. Therefore, each time a vegetable is known to have a higher content of methionine than normal, this will be indicated in the text, according to the data contained in the work of BUSSON and in FAO "Amino acid content of foods". This applies to contents above 2 g of methionine per 16 g N (which corresponds with 100 g protein). The standard FAO content is 2.2 g per 16 g N.

vegetables a long time into a thick, sticky sauce: palaver sauce, eaten with the main dish fufu. The sauce should be thick, viscous and slimy, since the fufu is dipped into it; normally, it is bitter, salty or hot (chillies). Often people use a powder obtained from dried leaves.

Another way of preparing vegetables is to boil or stew them with chillies (sambalan, Indonesia) or curry (India). Sometimes the vegetables are shredded and fried (India).

Generally, boiling for a long time diminishes the vitamin C content; the influence on the vitamin A and carotene contents is still somewhat uncertain; on the other hand, it may destroy poisonous substances. It is a fact that by boiling in much water and throwing away the superfluous water, part of the water-soluble vitamins (e.g. B and C) disappear. How digestibility is affected by eating vegetables raw or boiled for a short time, is not certain. In general the digestibility of young leaves is estimated at about 80%.

Drying in the sun and above a fire impairs vitamin C and B<sub>2</sub> contents. More serious is the fact that the proteins and their digestibility may be affected. This may depend for a large part on the temperature during the drying process, which should not be higher than 60°C. The situation is not clear: proteins may be affected chemically, the process may have to do with sugar caramelization which starts above 60°C and which could promote the formation of inactive protein compounds, or irreversible drying out of the vegetable matter could affect digestibility.

It should be stressed that many tropical vegetables cannot be eaten raw, since they are then irritating or even poisonous e.g. leaves of *Poinsettia* (*Euphorbia pulcherrima*), young leaves and shoots of manioc (*Manihot utilissima*).

## II. THE CULTURE

Vegetables may be grown for the market or for home consumption. When they are grown for home consumption, this may still be done in any of three different ways, viz. planted in well cared-for and manured beds, as is usual for the commercial cultures, or as an intercrop between agricultural crops, or seemingly running wild around the house, without much care or manure. Which manner of growing should be preferred, depends on the circumstances.

1. *Vegetables for the market.* These are often grown in accordance with the demand from the well-to-do public for European vegetables such as cauliflower, beans, lettuce and radishes, which do not grow naturally in the tropics. Therefore, they need very intensive care but, owing to the high prices they can command, the culture is still paying. Most of the time they are too expensive for ordinary people. Moreover, the seed of many of them cannot be grown in the tropics.

Commercial growing of real tropical vegetables is very rare outside India and South-East-Asia. They are then found in special small farms or in crop rotation with agricultural plants, mostly for the city markets.

2. *Intensive culture of vegetables for home consumption.* This type of cultivation, e.g. on beds, is still rather rare. The ideal place for them is near the house where it is possible to give them the regular care vegetables need. In this case, one should choose the tropical kinds as they are better adapted to the climate and soil and therefore easier to grow.

In regions with long dry periods where vegetables can only be grown without special measures in the rainy season, cultivation on beds is often even the only way to have fresh vegetables available for daily use all the year round. The choice of the site for the small gardens depends on the presence of water. Sometimes there are gardens in the river valley for the dry periods and others at a higher level for the rainy season. Furthermore, during the dry periods people are often reduced to eating leaves and shoots of trees and shrubs. Often the local trees and shrubs make a new flush in the dry season.

3. *Vegetables for home consumption planted between the field crops,* especially in regions with shifting cultivation. In this case vegetables are available during the rainy season, but in the long dry periods without cultures the necessary vegetables are absent from the diet. Often this means that little attention is paid to vegetables and their scarcity. If at the same time an insufficient quantity of other vitamin A containing foodstuffs is used (e.g. animal fat in the form of meat, fish, eggs, milk or cheese, or vegetable fats with carotene such as red palm oil), blindness often occurs in young children. Vegetables from trees and shrubs and the gathering of wild plants will then take on greater importance. In regions with permanent agriculture, where vegetables are intercropped, the same holds good generally but for the fact that sometimes irrigation makes vegetable growing possible even in the dry periods. In some regions the vegetables are intercropped on the fields near home so that they can be collected on the way back from the farthest fields.

4. *Mixed gardening in home gardens* is a very special form of vegetable growing: the combined, seemingly wild growth of vegetables, fruit trees etc. on the compounds near the houses, as is usual in several regions of South-East-Asia. Prerequisites for a favourable production are: a climate with plentiful rain without long dry periods, individual houses with enough space around them and an altitude of less than 800 m above sea-level. Only then a sufficiently varied assortment of vegetables which regenerate naturally and produce the whole year round is possible. Besides these, vegetables are often periodically grown between the normal food crops (egg plant, red pepper or chillies, young maize).

From commercial cultures and from intensive vegetable growing for home consumption on moderately good soils, which are continually under cultivation, a harvest of 10,000 kg a year of the finer varieties may be expected; of the coarser kinds 15,000 kg. On good soils in a rainy climate this may even amount to 15,000 or 25,000 to 30,000 respectively. If the dry periods are of long duration and the soils not so good, the first mentioned figures are to be halved, because a lesser number of harvests is possible.

The output of mixed cultures between the normal food crops is difficult to assess.

On well planted compounds one may expect from 3,000 to 5,000 kg per ha or even more but the presence of a relatively large number of fruit trees and other plants may reduce the harvest to 500-1000 kg a year, especially in the case of long dry periods.

An enumeration and description of the most frequently grown vegetables will be found in chapter IIIA, but we should bear in mind that high belts occur in the tropics (Cameroon, Kenya, Tanzania, Uganda, Andes, Ethiopia) where the plants of tropical lowlands do not grow any more, nor those European varieties which need both summer and winter or long days.

Chapters IIIB, C and D contain an enumeration of those vegetables which are generally gathered and of occasional vegetables.

#### A. COMMERCIAL CULTURES AND SEPARATE CULTURES FOR HOME CONSUMPTION

Growing plants, and vegetables in particular, need water and air in the soil, for the roots must take up water and also nutrients so they have to be able to breathe.

A soil which contains much clay, as most of the heavy soils do, can keep a lot of water and nutrients as a reserve for the plants. On the other hand, the water does not sink easily through it, so that when it rains, all interstices are rapidly filled with water and all the air is driven out. It will be necessary to drain off the superfluous rain water by making ditches etc.

A sandy soil or a red lateritic soil can only keep available little water and a small amount of nutrients as a reserve for the plants. Moreover, the water sinks rapidly through it, so after rain or irrigation this type of soil will soon be too dry. Soils containing much organic matter and humus, i.e. decomposed waste matter from plants and suchlike, have special properties. The humus etc. can hold a large quantity of water and nutrients for the plants. It cements the loose sand particles and the fine lateritic particles together, so that crumbs are formed which leave some room for air when it rains.

The humus also gets between the fine clay particles; this breaks up their strong cohesion and here too, crumbs may be formed by tillage. The soil becomes looser and contains more air spaces. This explains the favourable results with waste matter from plants (green manuring, farmyard manure,

compost etc.). Moreover this kind of manure brings nutrients for the plants into the soil.

#### *Choice of site*

For commercial cultures and cultures for home consumption on beds or on the crop fields, it is desirable to have flat or gently sloping plots, if possible crop fields already in use, or those with benign weeds, or under young or old forest. Plots with noxious grasses having rhizomes such as *Imperata* (alang, cogon) or having small tubers such as *Cyperus* are less well suited because they are difficult to clear and to keep clean.

If there are dry periods, water has to be present to allow a continuous cultivation. It should be easy to direct this to the plot and irrigation is greatly helped by a gentle slope. Where irrigation possibilities are lacking we need water in the immediate vicinity in rivers, ponds, wells or springs. In the absence of such water, we have to confine the culture to the rainy season and be content with trees and shrubs in the dry period.

During the wet monsoon, the plot should not suffer from a surplus of water; sometimes draining ditches will have to be dug for directing the water to lower terrain. Moreover, in case of irrigation in a climate with little rain, the surplus irrigation water will have to be drained off in the same manner, to avoid salinization of the soil.

Should a steeply sloping plot have to be used, this must be terraced to avoid erosion. In such a case, care must be taken that the topsoil, which is usually much more fertile than the deeper layers, stays on top. First, the topsoil is scooped off and put on the higher and lower parts in the vicinity, then the underground is terraced and the topsoil put back.

Plots with a steep slope usually have a very low fertility, because erosion is strong and the good topsoil is quickly carried off. When they have to be used, much manure is needed or green manures have to be sown, but even so good terracing from the start is much better.

No hard layers (hardpan, alios, padas) may occur at a depth of less than 40-50 cm and no clay layer either in a sandy soil, because these layers are not permeable; during the rain the topsoil will be too wet and airless.

On the other hand, no specially permeable layers should occur at this depth either, because the water would sink too rapidly through them and the natural ascension of sufficient water for the roots becomes impossible.

In both cases, the contact with the underground is lost and the roots are often unable to cross these layers. The conclusion is that the soil must be 1) neither too loose, sandy and permeable so that it contains insufficient water and nutrients nor 2) too heavy and loamy.

All soils can be improved by heavy manuring with dung, compost, organic waste matter from the village or from the market. Ideal soils are crumbly, reasonably permeable and water retaining.

In dry periods, the topsoil often gets too dry and hot through the fierce

sun; in this case mulching (covering the soil with straw, dry grass etc.) between the plants becomes desirable.

However, one should never manure by digging in such dry material as straw, without its being decomposed, because the decomposition requires the nutrients in the soil, which are then unavailable for the plants. It may take half a year or more before the nutrients are again available.

Suitable soils are usually:

1. young forest soils, rich in humus, but taking a lot of work for clearing;
2. soils in river valleys where finer materials have been deposited gradually, on condition that they are not too sandy or stony and without sudden inundations during the time of growing;
3. soils in a depression or subsidence of the ground, where eroded material and humus have been deposited, on condition that there is no surplus of water and no impervious layers.

Which plants can be grown, depends in the first place on the climate. The height above sea-level (which determines the temperature) is the factor which decides whether European vegetables can be grown such as cauliflower, leek, beans, peas etc. Nowadays new varieties are introduced in increasing numbers, e.g. of cauliflower for the low plains, but growing them still meets with special difficulties. Success in growing vegetables depends also on daylength. The really tropical vegetables are adapted to the high temperature and humidity of the tropical lowlands and the short days as well as to the relatively poor soils. Therefore, they are by far the easiest to grow in all seasons, if only there is water.

As we have mentioned before, insufficient rainfall or too long dry periods can be compensated by a good water supply, especially by irrigation. Even if the average rainfall during the whole of the year is sufficient, a sound irrigation offers a great advantage in that it makes the grower less dependent on the weather. Without rainfall, at least one liter of water per ha per second will have to be provided.

In very permeable, light soils (sand or deep red laterites) with long dry periods, a satisfactory irrigation is difficult. The water sinks too rapidly through the soil and the plant nutrients are washed away. In these cases, very heavy manuring with organic matter is necessary, as well as very much water. So it is better to look for less permeable soils, if possible with a higher water retention. For commercial cultures sprinkling is feasible, but it requires great capital investments (of the order of £ 200.--. per ha) and the yearly costs are at least from £ 10.--. to £ 20.--. per ha.

But then, less water is lost in sprinkling than in irrigation, where more water sinks into the soil on the field and where more water evaporates from, and seeps through the irrigation ditches.

#### *Tillage and manuring*

Intensive soil cultivation is always highly recommended in vegetable

gardening, at least in temperate climates, as this promotes good soil structure and healthy growth. However, regular exposure of most tropical soils to the combined influences of sun, air and a humid environment leads to a very rapid deterioration of humus and other organic matter, resulting in soils without the capacity to keep nutrients and water available for the plants. Only young volcanic soils and some heavy clays in which the clay minerals take over the function of humus, can stand regular cultivation and even so, this may damage the structure of the clay soils. Therefore, cultivation should always be combined with the application of decomposed organic matter (compost, stable manure etc.). For the breaking of crusts, e.g. after watering, or for weeding, very shallow cultivation with a hoe or scuffle is advisable.

Except after clearing a soil under forest (which has already a good structure), the first tilling has to be two spits deep with a spade or hoe, i.e. to a depth of at least 30 cm. The bottom spit should remain under the upper spit, which is turned over on top of it.

In digging with a *shovel* or *spade* an open furrow is used; the bottom spit is turned and then the upper one from the next furrow put on top of it.

In tilling with a *hoe* an open furrow is also used; first the top layer of a narrow strip is put away, then the second layer is hoed, after which the upper layer of the next strip is hoed over on the first strip etc.

The spade tills the soil better than the hoe, but it takes more time. Moreover, in the tropics the spade is often unknown; only the hoe is in use for this type of work.

For normal upkeep one spade deep digging is sufficient. It may be done with a furrow, especially when there is much weed or when manure has to be worked in; in this case the sod is first cut and turned over in the open furrow. On clean ground this is not necessary.

Digging while standing on the as yet untilled part of the ground and working backwards is less laborious. This is to be preferred to hoeing because one does not trample the tilled part and because it is a less rough method, but hoeing is quicker.

Repeating the trenching (two spades deep) e.g. once every four years, may be desirable but this depends on the soil structure.

Workability of the soil is influenced to a great extent by the weather. Light, sandy soils are always workable, whether dry or wet. Heavy soils may not be worked during abundant rains, else they become compacted and, on drying, fall apart into hard clods which are unsuitable for cultivation.

Therefore, most soils are tilled when they are half-wet, either because they have dried sufficiently after the last rains or because the rains set in slowly and have wetted them sufficiently.

Very heavy soils are sometimes broken up by means of a crowbar before the wet monsoon; the clods fall slowly apart through the action of the rains. Usually, if the soil is tilled under the right conditions, the clods and

crumbs come apart quite easily through the rain or, in the case of seedbeds, through sprinkling.

If the water supply is well regulated, one may always keep the soil workable in the dry season.

Normally vegetables are planted on beds, especially the finer varieties. These beds usually have a width of at least 1 m for vegetables or  $1\frac{1}{2}$  m for nurseries, so that the middle may easily be reached from both sides.

The paths between the beds are made as narrow as possible, after the whole of the plot has been tilled.

Usually the beds are rectangular. On the short side at the back they are bounded by ditches leading to the main drainage of rain water, and on the short front side by wider paths, the main paths which are parallel to the ditches. Especially during the rainy season the ditches and narrow paths are important for rapid draining. If the water flows too rapidly, small dams are made in the paths and ditches by means of piled up stones or of sticks rammed into the ground.

If the soil is not too easily eroded, the paths are deepened in the rainy season; if necessary, the sides of the beds may be protected against erosion by bamboo mattings. During the dry season the ditches may sometimes be used for the water supply, but more often the paths are used. Mostly special supply lines are necessary along the main paths. For an efficient irrigation without too great losses of water about 30 l of water at least should be led per second through a primary ditch. When there is little or no rainfall, the beds are made as low as possible and the ditches filled up with mulch, prunings etc. in order to limit the evaporation.

Water should never stand for days at a time in the paths and ditches, because the roots might rot.

Usually applying the manure is combined with tilling; the manure is then put into furrows and the upper soil layer shoveled or hoed over it. In soils that have already been used and are going to be replanted, the manure may be raked in; in this case it has to be finely distributed.

The best fertilizer is farmyard manure; if this is not available, at least not in sufficient quantities, village or market refuse and compost may be used instead.

For effective use vegetables need from 50,000 to 100,000 kg a year per ha. Usually such quantities will not be available; village refuse and compost can serve as a supplement.

Chemical fertilizers too should be used, e.g. nitrogen fertilizers such as ammonium sulphate, but this must be done on an organic-manure basis because otherwise the soil will often hold the chemical fertilizer insufficiently, so that it is washed away by the rains.

Concerning chemical fertilizers the local agricultural extension officer should be consulted. All plants need N (nitrogen), P (phosphor) and K (potassium).

It should be noted, however, that the manure quantities stated above

are only indispensable for the cultivation of the finer kinds of vegetables such as lettuce, carrots, beet, endive, celery, tomatoes etc. For the others, much less will usually suffice. Normally a good growth requires extra nitrogen (liquid manure, ammonium sulphate) but the soil may also need phosphor and potassium.

Compost can be made in a simple manner as follows: all kinds of waste matter such as leaves \*, grass, garden and kitchen refuse, are piled up in 20 to 30 cm thick layers, which are covered with 1 to 2 cm thick layers of earth. This is best done in shallow pits, covered by a pentroof against the rain and surrounded by a low earth wall against inundation. Generally, wooden parts and dry material should be avoided.

If part of the material is dry, it should be wetted with water. The whole has to be well tamped. The heap is once turned over and well mixed. Wetting it at the same time is useful. After six months or more, decomposition is complete. A disadvantage is that insects (flies etc.) may multiply in the compost. Sick plants should be burned.

A better though more laborious method is to pile the material up in the pit as described above and then to wet it with stale or other nitrogen fertilizers and tamp it firmly. The addition of nitrogen in the form of stale, farmyard manure, ammonium sulphate or ureum and suchlike is necessary when straw and/or other material with low N content is used. Dry material has to be wetted, but not so heavily that it drips.

The heap gets heated and this kills all animal life inside it. After a month the heap is turned over, mixed with the earth formerly used as a cover and again lightly wetted with stale or ammonium sulphate diluted with water. After another month this procedure is repeated; the result is a crumbly mass, which is as effective as half that quantity of farmyard manure.

The application of chemical fertilizers should be restricted to 50 g per square metre when tilling, and to 5 g per plant as a top dressing, otherwise there is a chance that the plants are damaged.

### *Seedbeds*

The seed is sometimes sown on seedbeds for later transplanting either directly to the perfecting ground or first to other beds called nursery-beds. Seedbeds ought to be carefully dug and no coarse manure applied on them. The soil becomes friable by systematic watering, combined with the addition of a mixture of e.g. cow manure and water. Hard clods are disposed of by raking and picking off. After sowing, the beds are lightly watered. As a protection against both too strong evaporation and heavy showers, a pentroof of grass, palm leaves etc. is fastened over the beds. Both before and after sprouting, the pentroof is taken away in favourable weather (moderate sunshine and morning sun). It serves only during heavy showers once the seedlings are well developed (from 2 to 4 fully grown leaves); they get more and more sunshine as they grow.

\* Water hyacinth is an excellent plant for composting.

In case of damping off of young seedlings it is useful to cover the seedbed with a thin layer of clean sand. When seeds are carried off by ants, sprinkling the seedbeds with sand mixed with kerosene is usually very helpful. During dry weather systematic watering is needed; this is done in the morning or in the evening, certainly not in fierce sunshine. Should the latter be unavoidable, then the ground *between* the plants should be watered, otherwise the plants may get burned.

On seedbeds are sown the fine seeds, the seedlings of which may be transplanted, such as lettuce, celery, tropical spinach (*Amaranthus*), cabbage, tomatoes, Chinese cabbage varieties, but generally not root vegetables such as beet, carrot, radish, Chinese radish, nor plants with big seeds such as beans, peas, cucumber and pumpkin.

From the seedbeds many plants go to the nursery-beds before they are transplanted to the field, e.g. tomatoes and cabbage. The nursery-beds too should be well dug and manured.

Each time when it is possible transplanting must be done with the ball of earth; this is made possible by light watering before taking up the plants.

Compressing the ball of earth to avoid losing part of it, is a wrong practice, because it is detrimental to the growth of the roots.

Planting distances are given in this book, but they vary much according to soil and climate or to the number of seeds per plant hole.

#### *Maintenance*

The most important maintenance tasks are: weeding, irrigation or watering, keeping the soil open and guarding against pests and diseases, sometimes top dressing. Of course, these operations apply particularly to commercial cultures; for home use it is better to choose those plants which need little care and are relatively free from pests and diseases.

Weed control and loosening the topsoil are combined in the form of shallow scuffling and hoeing. The hard layer that may be formed after watering has constantly to be broken up. This should be done to a very shallow depth because otherwise the roots get damaged and premature flowering will often result.

Pests and diseases occur so frequently and in such a wide range, that no information on them can be given in a nutshell. The principal pesticides (giving protection against damage done by insects) are parathion, dieldrin, aldrin (all of them very poisonous) and DDT, lindane and malathion (moderately poisonous) and pyrethrum powder etc.

Against diseases caused by fungi and bacteria are used e.g. copper, zinc and sulphur compounds, captan (poisonous except sulphur) and many others.

Especially in Africa, nematode damages are very serious; they are as yet difficult to control; this holds also for many fungi. In these cases crop rotation becomes necessary; planting of kindred plants such as tomatoes, red peppers, potatoes and egg plants soon after each other is to be avoided.

Planting *Tagetes* may destroy the nematodes, just like various chemicals.

For maintenance work we need various tools: spades, hoes, rakes, buckets, watering cans and drums or barrels for preparing liquid manure. Garden trowels for pricking out plants that have to be transplanted as well as seed boxes to be used instead of seed-beds, are desirable.

For controlling diseases and pests we need a.o. a good syringe for liquid dressings and bellows for applying powders.

#### *Choice of plants*

This depends, as stated above, on the climate, especially on the temperature (height above sea-level) and the duration of day light, on the quality of the soil, the damage done by diseases and pests and on the know-how of the man in charge.

Some vegetables such as headed cabbages (white, red and savoy), cabbages propagated by cuttings, borecole, New Zealand spinach, witloof chicory, celery, leek, chives, garlic, beans, peas, chocho, cauliflower, carrots, kohlrabi and potatoes are generally to be raised only with a fair chance of success at rather high altitudes (600 to 1200 m above sea-level), although some sorts of cabbage, beet, carrot and chocho can be cultivated also in the lowlands e.g. at 100 m above sea-level if conditions are otherwise favourable. Cropping real spinach in the tropics is practically impossible.

On the other hand, there are vegetables such as lettuce, Chinese cabbage varieties, purslane, endive, Indian spinach, Ceylon spinach or Surinam purslane, leaves of sweet potatoes, jute, cassava shoots, tropical spinach, kangkong, celery, leaves of taro or cocoyam, pods of cowpea, mung bean, sword bean, hyacinth bean; young fruits such as cucumber, loofah, bitter cucumber, various pumpkins and gourds, okra or gombo, tomatoes, egg plant, red peppers, melons and watermelons, shallots, Chinese radish and beet, which may be successfully grown in the lowlands too.

If sufficient water is available, almost all vegetables suitable for the altitude given may be grown with the exception of those which cannot stand abundant rains and so have to be cultivated during the dry season, such as headed cabbages (white, red and savoy), melons, watermelons and, in a lesser degree, cucumber. If the water supply is scant in the dry season, one has to rely on vegetables needing little water; these are usually of a somewhat inferior quality e.g. leaves of sweet potatoes, cassava shoots, pumpkins and gourds. Also okra, sword bean and hyacinth bean can do with less water than normal.

#### B. MIXED GARDENS OR COMPOUNDS OR HOME GARDENS

The situation is not always favourable for a separate vegetable culture. Often the women have to do agricultural work at a great distance from the house and to prepare meals on coming home or they take care of the sale of products. This leaves them no time for intensive vegetable growing.

In those cases — and this is easiest in regions with much rainfall without

long dry periods — one may plant around the house a mixed assortment of indigenous vegetables and fruits, herbaceous plants as well as shrubs and trees which are well adapted to the soil and so require little care. They may even run almost wild and the herbs can disseminate themselves.

The advantages attendant on this procedure are numerous. The soil around the house is often fertile, because all sweepings and refuse from the household collect there. It is shaded against direct sunlight, remains cooler and more humid and retains more organic matter. Moreover, the deeper roots may bring up sub-soil anorganic matter and the soil will be covered by leaves etc. It is possible to plant trees and shrubs near and in between the plants that grow in hedges or climb in trees and those that only cover the ground and often stand shadow quite well.

For this purpose we may choose some sorts of tropical spinach (*Amaranthus*, *Celosia*, *Talinum* etc.), purslane, cassava or manioc (for the leaves), red peppers, egg plant, black nightshade and suchlike (*Solanum nigrum*, *S. nodiflorum*, *S. esculentum*), okra or gombo, gedi (*Hibiscus manihot*), climbers like pumpkins, gourds etc., oyster nut and fluted gourd (*Telfairea*), Indian spinach (*Basella*), bitter cucumber (*Momordica*), snake gourd (*Trichosanthes*) and chocho (*Sechium*) for the leaves and fruits, as well as trees and shrubs such as papaw, joint fir (*Gnetum*), drumstick tree (*Moringa*) and *Sesbania* for the leaves; also beans such as cowpea, hyacinth bean, goa bean, sword bean and suchlike, of which the peas, young pulses and leaves may be eaten. For particulars see chapter IIIa, e.g. *Manihot* (cassava for the leaves), where the suitability for compound culture of many sorts of plants is given.

If the mixed planting has been done in the right way, there is every day something to be harvested for soup, sauce or savor (a sauce containing vegetables, eaten with the rice). The women can pick vegetables or potherbs while cooking without walking for long distances to the often remote fields. Such a compound crop takes little time and care. For a compound no more than 3 to 5 days a year need to be taken out, mainly for digging a plot for a new planting, which in its turn may be allowed to run wild.

As a supplement, the leaves of many already harvested crops may be eaten, e.g. cassava, sweet potatoes, cowpea, hyacinth bean, goa bean, red peppers. However, these old leaves often must be boiled for a long time (cassava for 1 to 2 hours). They are also dried and ground to powder.

On the compounds of tropical lowlands all sorts of fruit trees may also be planted. There is a wider range of possibilities for wet regions without long dry periods (less than 3 months with a mean rainfall of less than 60 mm per month) than for the drier ones.

Wet regions or regions with a high groundwater table	Dry regions
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<i>Achras sapota</i> (chico)	<i>Annona squamosa</i> (custard apple)
<i>Ananas comosus</i> (pine-apple)	<i>Anacardium occidentale</i> (cashew)

<i>Annona muricata</i> (soursop)	* <i>Averrhoa bilimbi</i> (cucumber tree)
<i>Annona reticulata</i> (bullock's heart)	* <i>Averrhoa carambola</i> (carambola)
<i>Artocarpus communis</i> (breadfruit)	<i>Citrus reticulata</i> (mandarin)
* <i>Artocarpus integra</i> (jack fruit)	<i>Citrus sinensis</i> (orange)
* <i>Carica papaya</i> (papaw)	<i>Mammea americana</i> (mammey)
<i>Citrus aurantifolia</i> (lime)	<i>Mangifera indica</i> (mango)
* <i>Citrus maxima</i> (shaddock)	* <i>Psidium guajava</i> (guava)
* <i>Citrus paradisi</i> (grapefruit)	<i>Punica granatum</i> (pomegranate)
<i>Cocos nucifera</i> (cocos)	
<i>Coula edulis</i> (attia)	
<i>Durio zibethinus</i> (durian)	
<i>Eugenia (Syzygium) aquea</i> (jambu)	
<i>Eugenia (Syzygium) javanica</i> (wax jambu)	
<i>Eugenia (Syzygium) malaccensis</i> (malay apple)	
<i>Garcinia mangostana</i> (mangosteen)	
<i>Lansium domesticum</i> (duku)	
<i>Musa acuminata</i> (mostly banana)	
* <i>Musa balbisiana</i> (mostly plantain)	
<i>Nephelium lappaceum</i> (rambutan)	
* <i>Persea gratissima</i> (avocado)	
<i>Spondias cytherea</i> (hogplum)	
<i>Salacca edulis</i> (salak)	
<i>Treculia africana</i> (African breadnut)	

Some of these come practically true from seed: many Java mangoes, avocado idjo pandjang of Java, papaw semangka of Java, *Garcinia mangostana*, *Lansium domesticum*, *Salacca edulis*.

Others vary only slightly: *Annona muricata*, *Annona reticulata*, *Annona squamosa*, *Coula edulis*, *Artocarpus communis*, *Artocarpus integra*, *Durio zibethinus*, *Treculia africana*, *Citrus aurantifolia*.

Again, others give only a small number of deviating seedlings which are sometimes easy to weed out: *Citrus reticulata*, *Citrus sinensis*, *Eugenia malaccensis*.

These are eminently suitable for distribution in gardens and compounds through school gardens because from the seeds taken home and planted there, useful trees may grow.

Well planted, mixed gardens with fruit and other trees, palms and vegetables requiring little care, have a special advantage for people in their old age, as they provide them with a basis of livelihood and some independence. This is another reason why their extension should be promoted.

\* also suitable for the other group.



1. *Abelmoschus manihot* Med.

### III. ENUMERATION OF VEGETABLES

#### A. THE PRINCIPAL CULTIVATED OR MUCH USED TROPICAL VEGETABLES

Tropical and sub-tropical vegetables may be distinguished as follows:

- A. Leaf vegetables for tropical lowlands.
  - a. Leaf vegetables for the sub-tropics and higher belts in the tropics.
- B. Pulses or their seeds for tropical lowlands.
  - b. Pulses or their seeds for the subtropics and higher belts in the tropics.
- C. Young fruits, seeds, bulbs, flowers and shoots for the tropical lowlands.
  - c. Young fruits, seeds, bulbs, flowers and shoots for the subtropics and higher belts in the tropics.
- D. Tubers and suchlike for the tropical lowlands.
  - d. Tubers and suchlike for the subtropics and the higher belts in the tropics.

cult. = cultivated plant.

numbers between brackets = protein content in percentages of fresh weight if not otherwise indicated.

*A cult.* *Abelmoschus manihot* Med. (Malvaceae). See *Hibiscus manihot*.

*A cult.* *Acalypha* species (Euphorbiaceae) such as *A. wilkesiana* Muell. Arg. (6-7%), *A. caturus* Bl., *A. Boehmeroides* Miq., all of them shrubs, and *A. indica* L. (6,7%) and *A. paniculata* Miq., herbs, of which the young leaves and shoots are eaten.

*A. wilkesiana* is a much grown ornamental plant with brownish to multi-coloured leaves. All are suitable for *mixed gardening*.

*A cult.* *Achras sapota* L. (Sapotaceae); Chico, Naseberry; Sapotillier (Fr.); Chico (Sp.). Pantropical fruit tree with milky juice, of which the young leaves and shoots may be eaten. Suitable for *compounds*.

*A cult.* *Acroceras amplexans* Stapf (Gramineae).

Grass grown and sold as a vegetable in Gambia.

*AC cult.* *Adansonia digitata* L. (Bombacaceae); Baobab.

The baobab is a tree of dry regions; the young leaves as well as the pulp

of the young fruits are eaten. Protein content of the young leaves 4-6% (rather rich in methionine). Suitable for largish compounds, perhaps to be tried as hedges. Also mentioned (for the leaves) are: *A. za* Baill., *A. grandidieri* Baill. and *A. madagascariense* Baill., all of them from Madagascar. The young tuber of *A. za* is also eaten.

*Aegle marmelos* L. (Rutaceae); Bael fruit.

A cult.

Primitive fruit tree of India and Indonesia of which also the young leaves and shoots can be eaten. Suitable for compounds.

*Aeolanthus pubescens* Benth. (Labiatae).

A cult.

Herb grown in Africa (Calabar) and eaten as a salad. *Ae. helitropioides* Chev. is used in the same manner and as a flavouring, just like *Ae. frutescens*.

*Agave cantala* Roxb. (Amaryllidaceae).

C cult.

Perennial herb (fiber plant) of which the young heart can be eaten, like that of *A. sisalana* Perr.

*Allaeanthus luzonicus* F. Vill. (Moraceae).

A cult.

Tree of the Philippines of which the young leaves and shoots (5.1%) and the young flower catkins (7-8.3%) are eaten. Grown near the houses and suitable for the compounds. The wild *A. glabra* Warb. is used in the same manner.

*Allium* spp. (Liliaceae).

All have very fine seeds, that cannot be kept for long:

*Allium ascalonicum* L.; Shallot; Echalotte (Fr.); Chalote (Sp.).

AC cult.

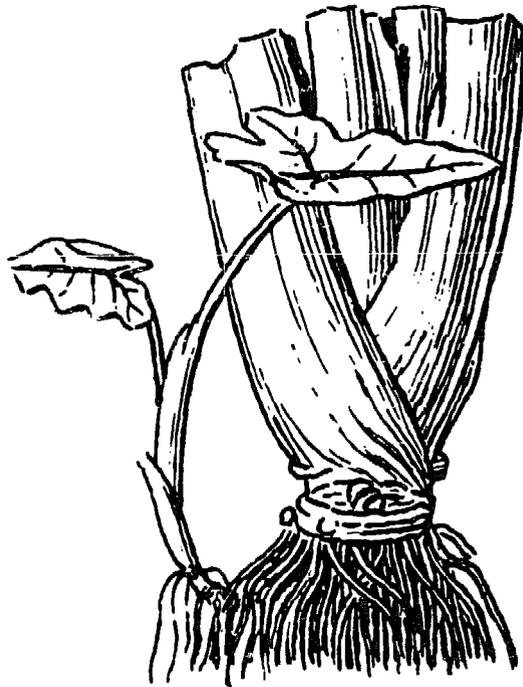
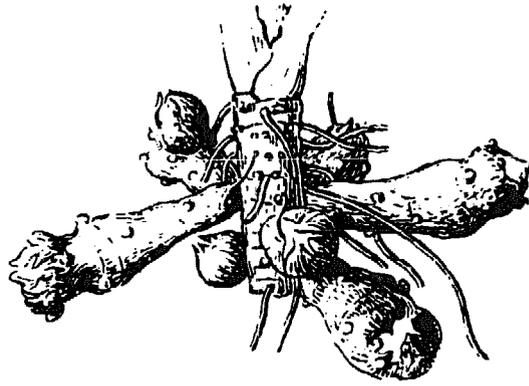
Important bulbous plant with hollow leaves; propagation not from seeds but through planting young small bulbs formed by the old bulb. Either the leaves are cut for consumption or the bulbs are left to grow until they are used instead of real onions. They need much water because the leaf tips wither easily, especially in case of insect damage e.g. thrips. Requires well manured, moisture holding soil. Plant sets 15-20 cm apart all ways. Needs 1500-3000 kg of sets per ha. Also suitable for lowlands if the soil is good. Protein content of the leaf 1.8%, of the bulb 1.5-2.6%.

*Allium cepa* L.; Onion; Oignon (Fr.); Cebolla (Sp.).

AC cult.

Important bulbous plant with hollow leaves, propagated from seed, grown for the young plants (spring onions) or for the bulbs. Most of the varieties are unsuited for the tropics, because bulb formation requires a daylength of 14 to 16 hours. Therefore, it is difficult if not impossible to grow seed. Suitable for the tropics are: Red Kano, Red Creole, Bermuda, Early Grano, Granex, Texas Grano, Crystal Wax, Early Yellow Cape Flat. The time of planting (preferably increasing daylength) may be important too. Sowing can be done on the spot, mostly in rows, or the seedlings are transplanted from seedbeds in rows 20 cm apart, with 18 cm between them. Per ha it takes 5 to 10 kg seed; when transplanting is done, 2 kg. Suitable for fertile, moisture holding and well drained soil. Much water is required, as with shallots (thrips). The culture is possible in the lowlands, but is usually more successful at greater heights. Protein content of the leaf 1.2-2%, of the bulb 1.3% up to 4%.

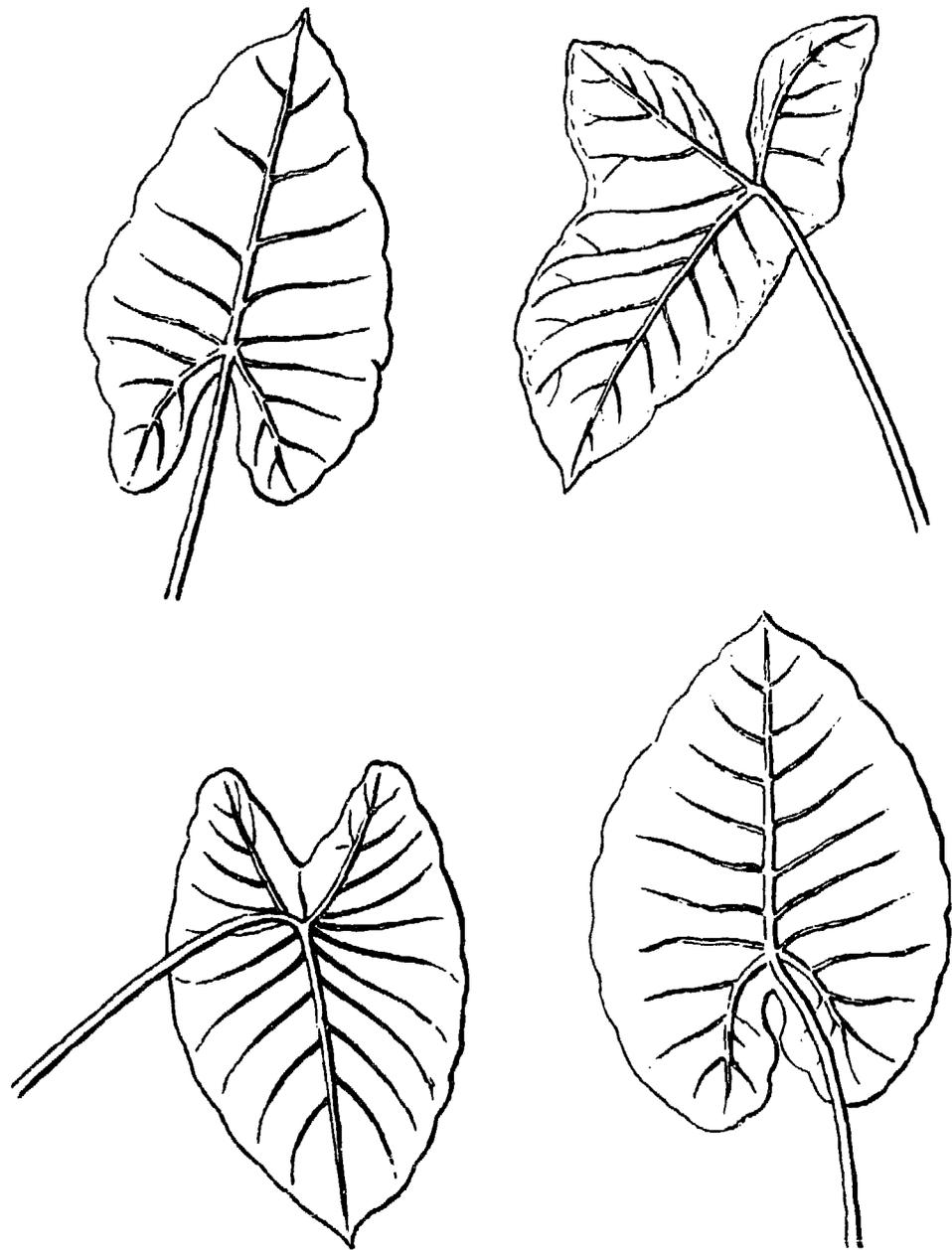
- a cult.* *Allium fistulosum* L.; Welsh onion; Ciboule (Fr.); Cebolleta (Sp.).  
Plant resembling leek but with hollow leaves, always propagated by dividing. The culture is very easy; planting 20 cm apart all ways. The growth is best at altitudes of more than 1000 m. Seed growing is difficult. The whole is eaten as a vegetable, just like leek. Protein content of the leaf 1.2-1.9%, of the thickened stem 1.2%.
- a cult.* *Allium porrum* L.; Leek; Poireau (Fr.); Puerro (Sp.).  
Plant resembling onions, but without bulbs and with flat leaves; always propagated from seed. The whole plant serves as a vegetable. The culture is like that of onions and requires also fertile soils, but planting is done at distances of 15 cm both ways. Seed requirements like those of onions. European varieties are suitable for altitudes of more than 1000 m. For the lowlands there are only a few suitable varieties, used in India, e.g. American Flag. Seed growing is possible but difficult. The seed has to mature in the dry season. Protein content of the leaf 1.5-2.5%, of the leaves and stems together 1.8-2.0%.
- Other onions are also grown for the leaves e.g.:
- a cult.* *Allium odorum* L.; Chinese chives (2.5-4%) and *A. schoenoprasum* L. (1.1-2.8%); Chives; Ciboulette, Civette (Fr.); Cebollino (Sp.).  
Both are exclusively used for seasoning.  
*A. angolense* Baker (Congo) and *A. tuberosum* Roth (China, India) are also known, just like *A. ampeloprasum* L., *A. nigrum* A. Chev. (Central Africa), *A. roseum* L. (flowers) and *A. criquetrum* L. (North Africa).
- a cult.* *Allium sativum* L. Garlic; Ail (Fr.); Ajo (Sp.).  
Bulbous plant growing only at rather high altitudes, also used as a seasoning. Protein content of the bulb 5-7%, of the leaf 2-2.5%.
- AD cult.* *Alocasia macrorrhiza* Schott. (Araceae).  
Not so important herbaceous plant, eaten only in an emergency, containing a thick milky juice, with big sagittate leaves without a marginal vein, with a black rhizome above ground, which is sometimes eaten. The wild variety has a pungent taste caused by oxalate crystals; it causes the mouth to itch, but there are some cultivated forms without this property; the leaves and stalks of these are eaten (India). Protein content of the rhizome 0.6%, protein content of the leaf unknown. Also the smaller *A. indica* Schott is known.
- A cult.* *Alpinia galanga* Sw. (Zingiberaceae); Greater galangal.  
Perennial herb of which not only the spicy rhizomes are eaten but also the young shoots, the flower buds and the flowers. Protein content of the shoots 0.5-1%.  
*Alpinia officinarum* Hance is the real "galanga" from China.
- A cult.* *Alternanthera* species (Amaranthaceae) such as *A. ficoidea* R.Br. var. (= *A. amoena* Voss) (4.1%), *A. maritima* St. Hil., *A. nodiflora* R.Br., *A. philoxeroides* Gris., *A. sessilis* R.Br., *A. triandra* Lam. (2.9%), *A. versicolor* L. (2.3-2.7%).  
Herbaceous weeds suitable as a vegetable (young foliage). Easy to propagate



## 2. TUBERS

Above: *Alocasia macrorrhiza* Schott.; *Xanthosoma violaceum* Schott.

Below: *Colocasia esculenta* Schott.; *Colocasia gigantea* Hook.f.



3. LEAVES

Above: *Alcasia macrorrhiza* Schott.; *Xanthosoma violaceum* Schott.  
Below: *Colocasia esculenta* Schott.; *Colocasia gigantea* Hook.f.

by cuttings. Especially the green forms of *A. amoena* are used. Protein content of the leaf 5%.

*Amaranthus* species and varieties (Amaranthaceae) such as *A. blitum* L., *A. caudatus* L., *A. chlorostachys* Miq., *A. dubius* Thill., *A. frumentaceus* L., *A. gangeticus* L., *A. gracilis* Desf., *A. hybridus* L., *A. lividus* L., *A. melancholicus* L., *A. mangostanus* L., *A. patulus* Bertol., *A. polygamus* L., *A. oleraceus* L., *A. paniculatus* L., *A. polygonoides* L., *A. spinosus* L., *A. sylvestris* Desf., *A. thunbergii* Miq., *A. tricolor* L., *A. tristis* L., *A. viridis* L. and others, among them many weeds. Probably many hybrids have been named as separate species; Amaranth, Chinese spinach; Amarante, Tampala (Fr.); Bledo (Sp.).

Important annual herbs with erect stems and flowers in spikes, grown for the tops and leaves, used like spinach, often especially for infants. The fine seed is sown densely in order to harvest the young leaves just like spinach. Seed required per ha: 40 kg, or 15 when thinned out and transplanted, or it is sown in rows 20 cm apart or transplanted spaced at 20 to 40 by 50 to 75 cm; in that case they are repeatedly cut back or plucked for the young tops until the plant runs to seed, which happens easily in drought. Varieties with big leaves e.g. bajem kebo (Indonesia) are much in demand. The first harvest comes 4 to 6 weeks after transplantation. For seedbeds 5 to 10 g of seed is needed per square metre. Seed growing is very easy. Both seed and seedlings suitable for the compounds where the plant can regenerate naturally. Protein content 2.5-6%, of the seeds 13% (*A. caudatus*), rather rich in methionine. Well known commercial variety: Tampala (*A. gangeticus* L.).

*Amomum maximum* Roxb. (Zingiberaceae), *A. citratum* Pers., *A. cardamomum* Willd. A cult.

The young shoots of these perennial herbs are eaten, but of *A. cardamomum* only the dry rhizomes (10%).

*Amorphophallus campanulatus* Bl. (Araceae); Elephant foot. AD cult.

Not so important herb which forms tubers and bulbils; it has big tripartite blades, each part being subdivided into numerous lobes; the flowers resemble arum; the big, somewhat flattened tubers are eaten (1-3%), at least those of the cultivated varieties (not with rough but with almost smooth leaf stalks); the young shoots are eaten too. Well-known is also: *A. rivieri* var. *konjac* Engl. (= *A. konjac* Koch). A cult.

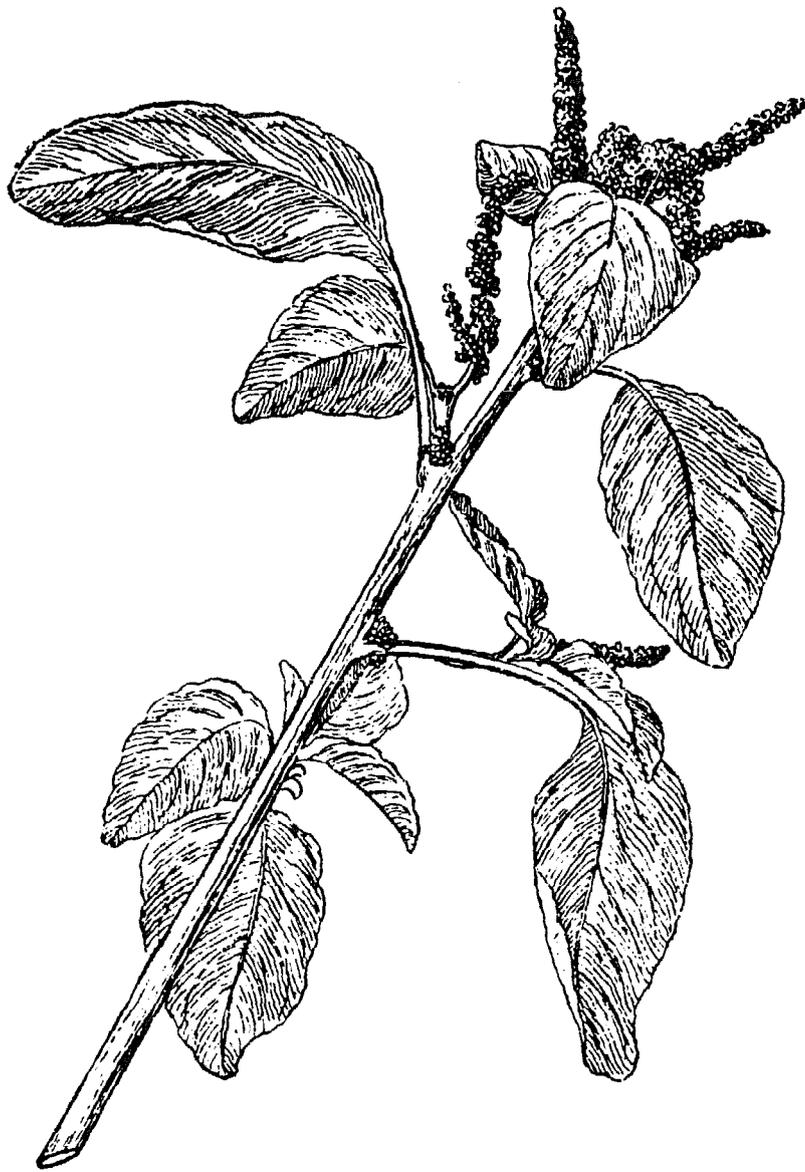
It is used for making flour. The wild forms have a sharp taste and cause the mouth to itch (oxalate crystals). Both stand shade and are suitable for the compounds. Grown like *Colocasia*. Propagation: both the bulbils from the leaves and parts of tuber peel with one or more eyes may be planted. Protein content of the tuber 1%, of the leaf unknown. The young leaves of *A. schweinfurthii* N.E. Br. are also eaten (Sudan).

*Anacardium occidentale* L. (Anacardiaceae); Cashew; Cajou (Fr.). A cult.

Pantropical fruit tree, of which the young leaves and shoots are eaten (3.8-5.2%). Suitable for the compounds.

*Ananas comosus* Merr. (Bromeliaceae); Pineapple; Ananas (Fr.); Pifia (Sp.). A cult.

Pantropical, perennial herb, of which the young heart can be eaten.



4. *Amaranthus hybridus* L.

- Anethum graveolens* L. (Umbelliferae); Dill; Aneth (Fr.); Eneldo (Sp.). *A cult.*  
Herb used as a condiment (seeds), of which the young leaves are eaten (3%) like those of *A. sowa* from India (3.4%). Partly also called *Peucedanum*.
- Annona muricata* L. (Annonaceae); Soursop; Corossol (Fr.). *A cult.*  
Pantropical fruit tree, of which also the young fruits (Java) and the young leaves and shoots can be eaten. Suitable for the *compound*.  
Of *A. senegalensis* Pers. the young flowerbuds are eaten.
- Antidesma buniis* Spreng. (Euphorbiaceae). *A cult.*  
Fruit tree from South-East-Asia, of which the acid young leaves are eaten, like those of *A. ghaesembila* Gaertn. Also *A. diandra* Roxb. (India) is eaten (7.2%).
- Anthriscus cerefolium* Hoffm. (Euphorbiaceae); Chervil. *a cult.*  
Annual herb of which the leaves (3.4%) are used as a condiment (= *Scandix cerefolium* L.).
- Apium graveolens* L. (Umbelliferae); Celery, Celeriac; Céleri, Céleri rave (Fr.); Apio (Sp.). *AD cult.*  
Perennial, herbaceous plant, grown for the green leaves as a condiment, for the full-grown, blanched leaves and leaf stalks as a vegetable, or for the tubers as a vegetable (Celeriac, Céleri rave; Apio). The leaves contain 0.7–2.3% protein (when blanched 0.7–0.9%), the tubers 1.5–2%.  
As a condiment, it is easily grown in the lowlands, but the blanched leaves and the tubers need rather higher elevations and very good soils. As germination is slow, the best thing to do is to sow on beds and transplant. For the leaf one may sow in rows 20 to 30 cm apart and then thin out till there is a space of 10 to 15 cm between the plants. Leaf celery may also be grown at lesser altitudes, but in that case it should be sown on shaded beds. For blanched celery: furrows 60 to 90 cm apart, each furrow being 45 cm wide and 30 cm deep, spaced at 25 to 30 cm. Earthing up is done gradually. For celeriac the same holds good; it can be grown on the flat, but in case furrows are used, these should be 45 cm deep too. Seed requirements: 1.5 kg to 2 kg per ha; when transplanting is to be done, only 0.5 kg.  
In China a special type is known: Chinese celery.
- Arachis hypogaea* L. (Leguminosae); Peanut; Arachide (Fr.); Alcahuete, Mani (Sp.). *AB cult.*  
The leaves of this well-known agricultural crop are sometimes eaten but generally they are only used as fodder. They contain 5.6% protein, the fresh seeds 13%, the dry, ripe seeds 26%.
- Aralia cordata* Thunb. (Araliaceae); Udo (Japan). *a cult.*  
Perennial, herbaceous plant from Japan, the blanched leaf stalks of which are eaten. Only suitable for the mountains.
- Areca catechu* Merr. (Palmae); Betel nut; Aréquier (Fr.). *A cult.*  
Of this much grown feather palm the palm cabbage is eaten (2.3–3.3%), like that of the related *A. borneensis* Becc. Often on *compounds*.
- Arenga pinnata* Merr. (Palmae); Sugar palm. *A cult.*  
Of this much planted feather palm too the palm cabbage (1.3%) is eaten.

It is also known as *A. saccharifera*. Of the related *A. ambong* the cabbage is eaten too, like that of *A. engleri* Becc. (Formosa). Suitable for the *compound*.

*d cult.* *Armoracia lapathifolia* Gilig. (Cruciferae); Horse radish; Raifort (Fr.); Rábano rusticano (Sp.).

Perennial herb of which the roots (2.7–3.1%) are eaten as a condiment.

*d cult.* *Arracacia xanthorrhiza* Bancr. (Umbelliferae) (= *A. esculenta* DC); Peruvian parsnip; Pomme de terre céleri (Fr.); Apio, Arracacha (Sp.).

As a tuber suitable only for very high altitudes, where it is a staple food (Andes). May also serve as a supplement in sauces etc. because of its light celery flavour. Protein content 0.7–1.2%. Propagated by runners (offshoots).

*A cult.* *Artemisia vulgaris* L. (Compositae); Mugwort; Armoise (Fr.).

Perennial herb, in Indonesia sometimes grown for the leaves. It is related to:

*A. dracuncululus* L.; Tarragon; Estragon (Fr.); Estragón (Sp.).

A condiment.

*BC cult.* *Artocarpus communis* G. Forst. = *A. altilis* Fosb. = *A. incisa* L.f. (Moraceae); Breadfruit; Arbre à pain (Fr.); Arbol del pan, Fruta de pan (Sp.).

Important tree which contains a milky juice, has shining, green, rough leaves and spherical fruits with sharp prickles; the young (spurious) fruits are eaten in all kinds of fashions e.g. cooked in soups and sauces and fried, whereas both young and ripe seeds are also steamed, cooked, roasted or fried. A fermented paste, which can be stored, is made from boiled or fresh fruit flesh (Polynesia). Suitable for the *compounds*.

There are two forms: one, breadnut, with seeds, from which it is raised, and one, breadfruit, without seeds, which is propagated by planting wrist-thick offshoots. Protein content of the young fruit 1–2.2%, of the ripe seeds 5.5%.

*ABC cult.* *Artocarpus integra* Merr. = *A. integrifolia* L.f. = *A. heterophyllus* Lam. (Moraceae); Jack tree; Jacquier (Fr.); Jaca (Sp.).

Important tree which contains a milky juice, has rough, leathery leaves which are glabrous when full-grown, and cauliflore, very big (spurious) fruits with conical prickles. The young fruits, ripe fruits (as fruit) and young seeds are eaten. The tree can stand drought but not water logging.

Propagation by seed. The young fruits are eaten in soups and sauces, as well as the young leaf shoots and young flowers (inflorescences). The seeds are often cooked, roasted or grilled. Suitable for the *compounds*. The young fruits contain 1.5–2.6% protein, the ripe ones 2% and the protein content in the seed varies from 2.5% (young) to 8% (ripe).

Other kinds that are eaten:

*B cult.* *Artocarpus nobilis* Thunb., *A. camansi* Blanco, *A. champeden* Spreng., *A. lakoocha* (India), *A. odoratissima* Blanco (1.3%) and *A. rigida* Blume.

Of these the young seeds are eaten. Those of *A. camansi* contain 1.6–2.5% protein. Suitable for the *compounds*.

*c cult.* *Asparagus officinalis* L. (Liliaceae); Asparagus; Asperge (Fr.); Espárrago (Sp.). Perennial herb with very fine, linear leaves; the young shoots are eaten

(1.4–2.2%), either green or blanched (by earthing up). Only suitable for altitudes of more than 1000 m. Several wild species are eaten in North-Africa.

*Asystasia gangetica* T. And. (Acanthaceae) = *A. coromandelina* Barth. A cult.

The leaves of this ornamental plant are eaten as spinach (3.7%), just like those of *A. schimperi* T. And. and *A. vogeliana* Ness.

*Atriplex hortensis* L. (Chenopodiaceae); Orach, Salt bush; Arroche, Belle dame (Fr.); Armuelle (Sp.) a cult.

Temperate herb, grown in India as a winter vegetable (4.5%). *A. crassifolia* C. A. Mey is also eaten, while *A. repens* Roth is gathered in Ceylon and *A. halimush* in the Sahara.

*Averrhoa bilimbi* L. (Oxalidaceae); Bilimbi, Cucumber tree. C cult.

Drought resistant tree, the cucumber-like fruits of which are used for souring dishes; the same is true of *A. carambola* L.

*Avicennia officinalis* L. (Verbenaceae). AC

Mangrove tree, of which the young leaves (5.8%) and the seeds (4%) can be eaten, the latter only after a special preparation (soaking in water etc.). Of *A. nitida* the young sprouted seeds are eaten.

*Azadirachta indica* Juss. (Meliaceae) = *Melia azadirachta* = *Antelaea azadirachta*; Neem. A cult.

Drought resistant tree from India, but now pantropical, of which the very bitter young leaves (11.6%) and the older ones (7.2%) can be eaten (India, Africa). Much smaller figures for protein are sometimes given. Also on the compound.

*Balanites aegyptiaca* Del. (Simarubaceae); Desert date; Dattier du désert (Fr.). A cult.  
Cultivated tree from Egypt; the young leaves and the flowers are eaten. It is drought resistant and common in the Sahel.

*Bambusa* spp. and others e.g. *Dendrocalamus*, *Gigantochloa*, *Phyllostachys*, *Schizostachyum*, *Oxytenanthera* (Gramineae); Bamboo; Bambou (Fr.); Bambu (Sp.) C cult.

Perennial, grasslike plants with thick, woody culms; the young shoots of, a.o., *B. arundinacea* Willd., *B. atra* Stapf., *B. bambos* Backer, *B. multiplex* Baensch, *B. spinosa* Bl., *B. vulgaris* Schrad., *Dendrocalamus hamiltonii* Nees et Ern., *Gigantochloa verticillata* and *Schizostachyum brachycladum* Kurz. are eaten. The protein content varies from 2 to 4%. Suitable for the compounds.

*Barbarea verna* Asch. (Cruciferae) = *B. praecox* R.Br.; Upland cress; Cresson de terre (Fr.); Yerba Santa Barbara (Sp.) c cult.

Vegetables with small leaves which are eaten raw. Needs much water and shade. For small areas.

*Basella* species (Basellaceae), known as *B. alba* L., *B. rubra* L. (= *B. cordifolia*); Ceylon spinach, Indian spinach, Vine spinach, Malabar nightshade; Brède de Malabar (Fr.); Espinaca de Malabar (Sp.) A cult.

Important perennial, herbaceous climber with thick fleshy leaves and pink or white flowers in short spikes. Sown (30 g per are) on seedbeds and transplanted at 40 to 50 cm against stakes, hedges, fences etc. However,



5. *Basella rubra* L.

propagation by cuttings is more usual. Grown for the young shoots and especially the leaves, which are somewhat slimy. After sowing, one has to wait for six weeks before harvesting, after planting of cuttings less. It requires a fair amount of water, but grows well on rather poor soils. Seed growing is very easy. Suitable for *compounds*. Protein content of the leaf 1-2.8%.

*Bauhinia* species (Leguminosae) such as *B. malabarica* Roxb., *B. purpurea* L. A  
(= *B. triandra* Roxb.), *B. reticulata* DC (= *B. thonningii* Schum.), *B. tomentosa* L.,  
*B. variegata* L.

Small trees or shrubs of which the sour-tasting young leaves and shoots are eaten. Protein contents: *B. malabarica* 2-2.6%, *B. reticulata* 3.8% and *B. purpurea* 3.6%. The young pods of *B. esculenta* and *B. reticulata* are also eaten. Some species are also known as *Peliostigma*.

*Begonia poggei* Warb. (Bagoniaceae).

A cult.

Herb from the Congo, with sour, edible leaves. Many other *Begonia* species are also eaten (Andes, India, Formosa, Java) e.g. *B. kotoensis* Hay (Formosa), *B. hirtella* Link., *B. siriculata* (Gabon) and *B. tuberosa* Lan.

*Benincasa hispida* Cogn. (Cucurbitaceae) (= *B. cerifera* Savi); Ash pumpkin, AC cult.  
Wax gourd, White gourd; Calebassier, Courge cireuse (Fr.); Calabaza China (Sp.).

Important annual climber with tendrils, malodorous leaves and yellow flowers; it has fruits which are white inside and covered with a white, waxy bloom. The young leaves and young fruits are eaten. The half-ripe fruits are sometimes candied or prepared in a similar manner. Protein content of the fruit 0.7%. Robust climber, spaced at 2 m, against fences, trees, buildings etc. Very suitable for the *compounds*. Harvest after 3 to 4 months.

*Beta vulgaris* L. forma *cicla* (Chenopodiaceae); Spinach beet, Swiss chard; A cult.  
Poirée (Fr.); Acelga (Sp.).

Kind of beet, congenial to the garden beet, grown for the young leaves, which are regularly cut and eaten in the same manner as spinach. More suitable for higher altitudes than for tropical lowlands. Sown in rows 60 to 90 cm apart, thinned out to 25 cm. First harvest 50 to 80 days later and then regularly during a long time, at least if well manured. Seed growing at low altitudes very difficult. Seed required: 8 to 10 kg per ha. Protein content 1.5-3.4%.

The leaves of ordinary beets and sugarbeets are sometimes eaten (1.7-3.4%).

*Beta vulgaris* L. forma *rubra* (Chenopodiaceae); Garden beet, Beetroot; Better- D cult.  
ave potagère, Betterave à salade (Fr.); Remolacha (Sp.).

Herb which forms root tubers; the leaves are red or green and red; small flowers in inflorescences formed by spurious spikes; the red tubers are eaten. Seed growing at relatively low altitudes impossible. Seed required per ha: 5 to 10 kg. Propagated by sowing either in batches of 2 seeds, spaced at 15 to 20 cm by 20 cm or in rows at 30 cm; in both cases thinning out is necessary. Transplanting gives less handsome tubers, but the best choice for it would be forms with round tubers such as Egyptian Flat or Sutton Globe. Protein content of the tuber 1.3-2.9%.

- A *Bidens* species (Compositae) such as *B. chinensis* Willd., *B. pilosa* L. (= *B. magnifolia* Scheff.), *B. bipinnata* L.  
Herbaceous weeds with square stems and yellow flowers; the tops are eaten in South-East-Asia and West-Africa (Sierra Leone). The young shoots of *B. leucantha* Willd. are eaten.
- C cult. *Blighia sapida* Koenig (Sapindaceae).  
Tree with bursting fruits; the aril, strikingly white around the black seeds, is eaten raw or fried in fat. Unripe and overripe fruits (windfall) are dangerous.
- A *Blumea* species (Compositae) such as *B. chinensis* A.DC., *B. lacera* A.DC, *B. balsamifera* DC and *B. myriacephala* DC.  
Herbaceous weeds with yellowish flowers; the juicy tops are eaten. *B. myriacephala* is grown in Indochina for seasoning fish.
- A cult. *Boehmeria nivea* Gaud. (Urticaceae); Ramie.  
Half-shrub (fibre crop) of which the young leaves (3.3%) can be eaten, like those of *B. platyphylla* D. Don from Africa. Suitable for the compounds.
- A *Boerhavia* species (Nyctaginaceae) such as *B. repens* L., *B. diffusa* L. and *B. plumbea* (= *Commicarpus plumbea* Standl.).  
Herbaceous weeds with thick leaves and small, stalked, pink, axillary flowers; the young tops are eaten. Protein content *B. repens* 6.1%.
- A *Bombax* species (Bombacaceae).  
Drought resistant trees, somewhat resembling capok: the leaves and seeds of *B. unguicarpum* Ulbr. and the flowers of *B. buonopozense* P. Beauv. are eaten. Also the leaves and flowers of *B. malabarica* DC (1.5%).
- A cult. *Borassus aethiopicum* Mart. (Palmae); Palmyra palm; Rondier (Fr.).  
Fan-leaved palm from Africa of which the palm cabbage is eaten. The swollen trunk distinguishes it from *B. flabellifer* L. from India and the Far East (Syn. *B. sundaica* Becc.), which is used for tapping sugar but its cabbage (2.7%) and its young and sprouted seeds are eaten.
- A cult. *Bouea macrophylla* Griff. (Anacardiaceae).  
Fruit tree of the wet tropics of South-East-Asia; the young leaves can be eaten. Suitable for the compounds.
- a cult. *Brassica alba* Boiss. (Cruciferae).  
See *Sinapis alba*.
- A cult. *Brassica chinensis* L. (= *B. napus* L. var. *chinensis* O.K. Schultz) (Cruciferae);  
Chinese cabbage, Petsai, Shantung cabbage; Chou de Chine (Fr.); Col China (Sp.).  
Important for commerce. Annual herb; most varieties are headed; the flowers are a bright yellow. Sown on seedbeds, generally by the end of the rainy season or in the dry season (1 to 1.5 kg of seed per ha of plantation) and transplanted at interspaces of 30-40 by 30-50 cm. The plants require a very good soil and much care. Seed growing is very difficult, because it is a long-day plant, which blossoms very rarely in the tropics. The leaves are a light, yellowish green with white heavy veins; they are eaten as a vege-

table, preferably not cooked but stewed in a little fat, so that they do not lose their consistency. Protein content 1-2%.

*Brassica integrifolia* Schultz, var. *chevalieri* Port. (= *B. juncea* Coss.).

*A cult.*

Unheaded cabbage variety cultivated in the African tropical-forest region (Gabon). It resembles the perennial variety *carinata* Schultz from India, grown in Ethiopia, reaching heights of 1.5-2 m. Related is also the Loffo cabbage from Sierra Leone, grown from cuttings.

*Brassica juncea* Coss. (Cruciferae); Chinese mustard, Indian mustard; Moutarde de Chine (Fr.); Mostaza de la tierra (Sp.).

*A cult.*

Important for commerce; annual herb; some varieties are headed, with bright, yellow flowers. Sown like Chinese cabbage and transplanted at 20-25 cm (5 kg per ha). Usually the younger plants are eaten completely; in this case, it is sown very densely. The wilder forms disseminate themselves on the compounds and their requirements are less. Protein content 1-3%. It is a congener of:

*Brassica campestris* L. in many forms a.o. var. *sarson* Prain (4%) and var. *dichotoma* Watt (5%), both from India.

The headed form (*B. rugosa* Prain) is grown most often; it requires a good soil and care. Seed growing is easy. The leaves are a dark green, sometimes (at least the young ones) a little hairy and reddish tinged. The lower leaves are not or scarcely divided. Mention is also made of *B. schimperi* Boiss. and *B. tournefortii* Gonan, both from Africa, the latter also from India.

*Brassica napus* L. (Cruciferae) = *B. napus* L. var. *napobrassica* Peterm.; Swede, Rutabaga; Chou navet (Fr.); Nabo de invierno, Rutabaga (Sp.).

*d cult.*

Herbs forming root tubers; the leaves are covered with a waxy bloom and glabrous; the flowers are a bright yellow; the tubers which are yellow or white inside, are eaten. They are sown in rows thinned out at 30-40 cm both ways. After 3 to 4 months the plants may be harvested. Seed required per ha: 2-2.5 kg. Most suitable for the dry season, preferably at altitudes of more than 1000 m; even so, one should choose varieties with round tubers. The forms with white flesh are more drought resistant than the others. Protein content of the tubers 1.1-1.7%, of the leaves 2.5-2.9%.

*Brassica nigra* Koch (Cruciferae); True mustard, Black mustard.

*a cult.*

Of this oilseed plant the leaves are eaten in India.

*Brassica oleracea* L. (Cruciferae).

Stalk forming cabbages. Usually, seed growing is impossible in the tropics because flowering requires a cool resting period. Seed cannot be stored for long. Seed required per ha: 2-2.5 kg, if transplanted 0.5-1 kg. Protein content of the leaves 1-2%, those of I: 1-4.5%. Important for the market. The seedlings are sometimes very much damaged by click beetles, which eat small holes into the leaves.

I. var. *acephala* DC.

i. forma *sabellica* L.; Borecole, Curly greens, Kale; Chou fris  (Fr.); Berza (Sp.).

*a cult.*

Herb with erect, robust and sometimes high stems and crispy, deeply cut

leaves. The seed has to be imported. Principally suitable for belts higher than 1000 m, but may be grown successfully at lesser altitudes. Requires a very good soil. Has to be sown and transplanted. Protein content 2-4.5%. The relation with *B. campestris* and *B. integrifolia* is not clear.

*a cult.* ii. forma *viridis* DC; Collards; Chou vert, Chou drageons (Fr.); Berza común (Sp.).

Herb with flat, deeply cut leaves and erect, robust stem varying from low to high growing, which gives a lot of lateral shoots after the leaves have been harvested. It can only be propagated by cuttings of these lateral shoots; time of growth up to 8 months. Also suitable for the full rainy season. Suitable variety: Argalingga (Java). Protein content 2.5-4.5%. Some of its types may form heads at higher altitudes.

*c cult.* II. var. *botrytis* L.; Cauliflower; Choufleur (Fr.); Coliflor (Sp.).

Sort of cabbage, of which the thick-set inflorescences are eaten. There are perhaps a few kinds which may occasionally be grown in the tropical lowlands e.g. Early Patna and Early Market (from India). Most of the European kinds will grow well only at certain heights above sea-level: 1000-2000 m. A suitable kind for high belts is Lecerf. To be treated like drumhead cabbages (vide IV). Seed growing is difficult but possible in the dry season at high altitudes, e.g. under a small glass cover. Protein content 1.5-2.8%; that of the young leaves, which are often eaten, is up to 5.9%. Those types which yield only after a not too cold winter period, are called broccoli in all languages. They are unsuitable for the tropical lowlands. Their leaves and shoots and even young plants are often eaten (4%).

III. var. *bullata* DC.

*u cult.* i. forma *gemmifera* DC; Brussels sprouts; Chou de Bruxelles (Fr.); Col de Bruselas (Sp.).

Herb with a very long, erect stem; the lateral buds form small heads which are eaten. Except e.g. Express (India), they are suitable only for the mountain belts at more than 1000 m; even there the culture is not always successful. The seed has to be imported. To be sown on seedbeds and transplanted. Protein content 3.6-5.2%. Requires a good soil.

*a cult.* ii. forma *sabauda* L.; Savoy cabbage; Chou milan (Fr.); Berza enana, Berza de Milan (Sp.).

This is sometimes attributed to the following group, but the stem is longer and the head more loose. Herb with erect stem and lumpy leaves forming a rather loose head. The seed has to be imported, but some kinds are easy to propagate by cuttings. When it is sown, it has to be transplanted. As cuttings are used the shoots which come from the stump after harvesting. Also the stump itself may form a new cabbage. Suitable for mountainous regions, where this cabbage is planted, even in the midst of the rainy season, at distances of 60 cm. Harvest after 2 or 3 months. Protein content 1.7-3%.

*A cult.* IV. var. *capitata* L.; Drum(head) cabbage; Chou pommé, cabus (Fr.); Repollo, Col (Sp.).

Herb with short, erect stem and smooth leaves forming a firm head. Suitable for the good soils of the mountainous regions; also possible on very good soils with sufficient water in the lowlands. If need be, cuttings may be used in the cool, wet regions but normal propagation is from imported seed. Unsuitable for the real rainy season, because it rots easily and caterpillars are difficult to fight off.

Duration of growth: 3 to 4 months. Seed requirements: 3 to 4 g per square metre of seedbed, transplanted to one are. Plant spacing: 50-60 cm. Improved white kinds: Glory of Enkhuizen, Golden acre; red kinds: Niggerhead, Zenith. Protein content 1.1-2.2%. In many parts of the tropics, headed cabbages are very popular vegetables, suitable for soups, sauces and raw or half-raw consumption. The yield per ha to be obtained after 3 to 4 months is very high: 20,000 kg and more. The product is easy to store and transport. In the mountainous regions, at mean temperatures of less than 15°C, a sauerkraut of good keeping qualities may be turned out; in hotter regions this is also possible if done in a cool place, but then the product cannot be stored.

V. var. *gongyloides* L. = var. *caulorapa* DC; Knol-kohl, Kohlrabi; Chou-rave *c cult.* (Fr.); Colinabo (Sp.).

Herbs forming stem tubers; the glabrous leaves are covered with a waxy bloom; the flowers are a light yellow; the white, greenish or blueish stem tubers, which are white inside, are eaten. Raised from seed that has to be imported; transplanted at distances of 30-40 cm by 40 cm. Seed required per are: 20 g. Has to be transplanted. Usually suitable only for higher belts, but also for the lowlands, if the beds are well manured and the water supply is sufficient. Protein content of the tubers 1-2%, of the young leaves 3.5%.

*Brassica rapa* L. (Cruciferae); Turnip; Navet (Fr.); Nabo (Sp.). Also mentioned as *B. campestris*, var. *rapa*. *d cult.*

Herb forming root tubers; the flowers are a pale yellow; the leaves somewhat hairy without wax; the tubers, with their reddish, blueish or blackish tinged topsides, are white inside; these are eaten and sometimes also the young leaves. Also suitable for the lowlands. Seed (to be imported) required per ha: 1.5-2.5 kg. Protein content of the tubers 0.5-1%, of the young leaves 1.5-5%. Preferably round or flat kinds are sown: either very densely for the leaves or in rows 40 cm apart for the tubers; in the latter case they are thinned out to 10 cm. In the lowlands they should always be grown in the shade. First harvest after 2 months. Not so suitable for the dry season, because one gets few or no tubers; they don't resist heavy rains either.

*Brosimum alicastrum* Sw. (Moraceae); Breadnuttree. *A cult.*

Drought resistant fruit tree of Central America, of which also the young leaves and shoots are eaten (3.2%). Suitable for *compounds*.

*Broussonetia papyrifera* Vent. (Moraceae); Polynesian mulberry. *A cult.*

Tree of which the young leaves may be eaten. Planted near the houses (*compounds*).

*Bruquiera gymnorhiza* Lam. (Rhizophoraceae). *A*

The young leaves of this mangrove tree may be eaten; also the young sprouted seeds (especially their marrow) of *B. caryophylloides* Bl., *B. eriopetala* W. et A. (= *B. sexangula* Pers.) and *B. parviflora* W. et A.

- AB cult.* *Cajanus cajan* Millsp. (Leguminosae) = *C. indicus* Spreng.; Pigeon pea, Angola pea, Congo pea, Red gram; Ambrévade, Pois d'Angole, Pois pigeon (Fr.); Guandu, Gandul, Guisante de paloma (Sp.).  
Important, annual or perennial, herbaceous shrub with yellow or yellowish-red flowers; the pods are short and beaked; the seeds have a sunken hilum with two protruding ridges; the young leaves, shoots and pods are eaten, as are also the young and ripe seeds. It is rather drought resistant. Propagation: sown in in the rainy season in batches of 2 or 3 seeds at distances of 1-1.5 by 1.5-2 m and later thinned out. It takes about 10 kg of seed per ha. The plant flowers after 3 months; the first young pods come after 5 months, after which small quantities may be harvested for months. The ripe seeds may be used for making taogé (= bean sprouts). The plant is suitable for the *compounds*. Protein content of the leaves 9%, of the young pods 7-10%, of the young seeds 7%, of the ripe seeds 20-22%.
- D cult.* *Calothea allouia* Lindl. (Marantaceae); Lleren (Sp.).  
This plant resembles *Canna* and has small edible root tubers; Caribbean region; propagation by division.
- A cult.* *Calathea macrosepala* K. Schum. (Marantaceae); Calathea.  
The young shoots of this herb (1.8%) are eaten.
- A cult.* *Caladium bicolor* Vent. (Araceae).  
Pantropical herb, of which the leaves may be eaten. The leaves have a marginal vein.
- A cult.* *Calopogonium mucunoides* Desv. (Leguminosae).  
Green manure, cultivated throughout the tropics; the young leaves and shoots can be eaten.
- AB cult.* *Canavalia ensiformis* DC. (Leguminosae); Jack bean, Sword bean; Haricot sabre, Pois sabre (Fr.); Haba blanca, Haba de burro, Judia sable (Sp.).  
Important herb, sometimes climbing; the pink flowers change to violet; the pods are long and sword-shaped with two longitudinal ridges; the seed is often white and has a hilum, which only takes up 1/7 to 1/10 of the seed's circumference. Grown for the leaves and topshoots, young pods, both young and ripe seeds. Even when using the ripe, white seeds, it is advisable to renew the cooking water once, while with coloured seeds even more care should be taken. The plant is drought resistant and suitable for the *compounds*. Seed required per ha: 100 kg. The bushy form is grown spaced at 1-1.5 m by 1 m. After 3 to 4 months the first young pods may be harvested. The leaves and young pods contain 2-7% protein, the ripe seeds 22%.  
The congenial climber *Canavalia gladiata* DC has white flowers changing to pink; the hilum takes up 1/4 to 1/3 of the seed's circumference; most seeds

are coloured. The ripe beans may only be eaten after all sorts of preparations: boiling, rinsing in running water, fermentation.

It appears that also parts of *C. maritima* Piper (*C. obtusifolia* DC) or *C. rosea* DC are eaten (Japan). However, it seems that the young pods are poisonous for many persons; they should be boiled for a long time in much water, which is to be renewed.

*Canna edulis* Ker. (Cannaceae); Purple arrowroot; Balisier, Arrowroot du Queensland (Fr.); Archira platanillo (Sp.) *D cult.*

Perennial plant with rhizomes, big leaves with parallel lateral veins and red flowers; the rhizomes are eaten. Propagation: the tips of the rhizomes are planted out at 1 m both ways. It can stand some shade. Suitable for the *compounds*. Protein content of the tubers 1%.

*Cannabis sativa* L. (Moraceae); Hemp; Chanvre (Fr.) *a cult.*

The flowered tops are eaten.

*Capparis corymbosa* Lam. (Capparidaceae) *A cult.*

Shrub grown in Africa, for its leaves which are rather rich in methionine.

The young fruits of *C. horrida* L. are eaten.

Sometimes the leaves of *C. decidua* Edgew. too.

The same is true of the flower buds of *C. rupestris* Sibth. et Sm. *AC cult.*

*Capsicum* species (Solanaceae); Chillies, Red pepper; Piment (Fr.); Aji, Pimiento (Sp.)

Important plant with annual forms (mostly with hanging, not very pungent fruits, which are sometimes very big): *C. annuum* L.; and perennial forms (*C. frutescens* L.) with mostly very pungent, small, upright fruits used as a seasoning. Both forms are rich in vitamin C. The young tops and leaves are also eaten. They contain about 8% protein, the fruits 1-4%. Suitable for moderately fertile soils. The annual forms are sown and, after a month, transplanted, spaced from 40 by 40 cm to 60 by 90 cm; this is preferably done by the end of the heavy rains, so that the fruits ripen in the dryer season. Harvesting begins 2 to 4 months after sowing. The forms with big fruits are sometimes seriously damaged by fruit flies. Seed required per ha: 2.5-5 kg; when transplanting takes place: 1/4 to 1/2 kg. The perennial forms are planted with more space, especially on the *compounds*.

*Careya arborea* Roxb. (Myrtaceae) *A cult.*

The young shoots of this tree from Thailand are eaten. In Indochina the leaves of the related *C. sphaerica* Roxb. are eaten.

*Carica papaya* L. (Caricaceae); Papaw; Papayer (fr.); Mamao, Fruta bomba, Papaya (Sp.) *AC cult.*

Important, monoecious or dioecious arborescent herb containing a milky juice; big, sinuate leaves; small, white flowers in long racemes (male plants) or in the leaf axils (female and monoecious plants); the fruits are hollow and contain many seeds; inside, they are yellow or orange to red; when ripe, they are eaten as fruits, when unripe they serve as a vegetable just like the young leaves and tops. Sometimes even the swollen roots are eaten. The leaves are bitter. The protein content of the young leaves is 2.5-8%.

of the young fruits 1-2.5%. Suitable for the *compounds*. From the normal forms whose seed yields male and female trees, some forms have been selected, all seeds of which yield monoecious trees e.g. papaya semangka (Java). When sowing the normal forms, about 3 seeds are put into each plant hole (spaced at 2.5-3 m) and as soon as the flowers appear, they are thinned out; the most vigorous of the plants are kept and at least 10% of them should be male. The seedlings of monoecious plants can be transplanted: 1 seed per hole. During the rains or with the help of irrigation the tree yields continuously. For forms with big fruits, one fruit a week can be counted upon, for the others more. The plant cannot stand water logging at all and it reacts very favourably to heavy manuring.

- A cult.* *Carpolobia lutea* Don (Polygalaceae).  
Herb grown for the leaves in the Congo.  
The leaves of the wild *C. alba* Don are also eaten.
- a cult.* *Carthamus tinctorius* L. (Compositae); Safflower, Kardi; Safran bâtard (Fr.).  
Salt resistant, oilseeds producing herb, of which the young leaves are eaten (2.5-3.5%). Subtropics.
- A cult.* *Carum involucreatum* Baill. (Umbelliferae); Caraway; Carvi (Fr.).  
Herb of which the seeds are used as a condiment and the leaves are eaten (2.9%). Suitable for the *compounds*. The real caraway is *C. carvi* L. of Europe. Its leaves are eaten too.
- AB* *Cassia* species (Leguminosae) such as *C. auriculata* L., *C. garrettiana* Craib, *C. laevigata* Willd., *C. obtusifolia* L., *C. occidentalis* L., *C. sieberiana* DC, *C. singulana* Del., *C. tora* L., *C. tomentosa* L., *C. mimosoides* L., *S. surattensis* Burm. f., *C. sophera* L. Herbaceous shrubs, of which the young tops and leaves (mostly sourish) can be eaten, sometimes also the young pods (*C. occidentalis*), seeds (most *C. spp.*) and flowers (e.g. *C. siamea*). Protein content of the leaves 3-6.2% (*C. tora* or foetid cassia). The latter and *C. occidentalis* are rich in methionine. Sometimes on the *compounds*. The leaves of *C. tora* are maladorous, those of *C. siamea* Lam. are said to be poisonous. In Thailand they are eaten, but they are boiled for one or two hours and the water is thrown away. Also the leaves of *C. alata* L. are eaten, but they act as a purgative.
- A cult.* *Ceiba pentandra* Gaertn. (Bombacaceae); Capok tree.  
The young leaves and pods may be eaten.
- A cult.* *Celosia* species (Amaranthaceae) such as *C. argentea* L., *C. cristata* L., *C. bonni-vairi* Schinz., *C. leptostachia* Benth., *C. laxa* Schum. et Thonn., *C. trigyna* L., Cock's comb; Crête de coq (Fr.); Mirabel (Sp.).  
Important plant, resemling *Amaranthus* also as regards the manner of raising them. The young inflorescences are also eaten. Forms easily much seed. Also suitable for the *compounds*. The leaves (2-4%) are eaten like those of *Amaranthus*, but they are somewhat slimier (*C. argentea* 2%).
- AC cult.* *Ceratotheca sesamioides* Endl. (Pedaliaceae).  
Herb, cultivated for its leaves (5.8%) and for the seeds. The very slimy leaves are rather rich in methionine.
- ad cult.* *Chaerophyllum bulbosum* L. (Umbelliferae); Chervil; Cerfeuil tubéreux (Fr.).

Perennial, tuberous herb, of which the leaves are used as a condiment and the tuber is eaten.

*Chenopodium album* L. (Chenopodiaceae); Pigweed; Chenopode commun (Fr.); *a cult.*  
Quenopodio (Sp.).

Herb grown in India for the leaves (2.1–4.7%). Also used are: *Ch. amaranticolor* Coste et Reyn. from Madagascar, *Ch. ambrosioides* L. (3.5%) from the Philippines, *Ch. berlandieri* Miq. from Mexico, *Ch. murale* L. from Africa, *Ch. nuttalliae* Saff. from South-America. Most of them are only grown in the subtropics or at higher altitudes. *Ch. quinoa* Willd. and *Ch. pallidicaule* Aillen are grown for the seeds (10–22% and 15%) in the Higher Andes; the leaves of *Ch. quinoa* are also eaten. *Ch. rubrum* L. too is eaten. Varieties of *Ch. nuttalliae*, which is specially used as a spinach for high regions, have been selected.

*Chrysanthemum coronarium* L. (Compositae). *a cult.*

Herb, of which the leaves (1.2–2.7%) are eaten in the Near-East, Malaya and Indochina, like those of the wild *Ch. segetum* L. (1.2%) and in India those of *Ch. indicum* L. (2%).

*Cicer arietinum* L. (Leguminosae); Chick pea; Pois chiche (Fr.); Garbanzo *ab cult.*  
(Sp.).

Annual herb with whitish pink to lilac flowers; the young leaves, shoots and pods are sometimes eaten, but mainly the ripe seeds. Protein content of the leaves 4–8%, of the seeds 20%. Only suitable for the subtropics, or perhaps for the very high belts in the tropics.

*Cichorium endivia* L. (Compositae); Endive; Chicorée endive scarole ou frisée *Aa cult.*  
(Fr.); Escarola (Sp.).

Herbaceous plant which forms heads; the flowers are blue; both smooth-leaved and curly-leaved forms are known. The curly leaves rot easily, especially when they are bound up for blanching. From the seedbed it is transplanted 30 to 40 cm asunder. Seed growing is possible. Seed required per ha: 5 to 6 kg; if transplanted: 0.5 kg. Protein content 1.2–2%.

*Cichorium intybus* L. (Compositae); Brussels chicory; Chicon, Witloof (Fr.); *a cult.*  
Achicoria de Bruselas (Sp.).

Herb which forms root tubers; blue flowers; the young, somewhat bitter, blanched leaves are eaten. The young heads are formed by stripping the tubers of the leaves and burying them, after which they are covered by sand or bamboo cylinders. Suitable only for rather high altitudes. Seed required per ha: 5–6 kg. Protein content 1.7%.

*Citrullus vulgaris* Schrad. ex Eckl. et Zeyh. = *C. lanatus* Mansf. (Cucurbitaceae); *ABC cult.*  
Water melon; Pastèque (Fr.); Scandia, Melón de agua (Sp.).

Important annual climber with tendrils and deeply incised leaves; the flowers are yellow and the fruits roundish, yellow or red inside; these are only eaten when ripe; the seeds and sometimes the very young leaves are also eaten. Protein content of the fruits 0.5–1.5%, of the seeds 25–32%. The seeds are rich in methionine.

This plant is mostly grown creeping; batches of 2 or 3 seeds are put at distances of 1.5 to 2 m. Suitable mainly for the dry season; therefore, sowing

takes place by the end of the rainy season, preferably on good, moisture containing, rich soils. In dry seasons they are often grown in the dry river beds. Harvesting starts after 3 months and continues for 2 months. Seed required per ha: 1.5 to 2.5 kg. Suitable varieties: Congo, Tom Watson.

*A cult.* *Claoxylon longifolium* Miq. (Euphorbiaceae).

Shrub or small tree of South-East-Asia, grown in Malaya for the leaves and shoots (5.4%). Propagated by cuttings. Also known for their leaves are *C. polot* Merr. (= *C. indicum* Hassk.), a tree from South-East-Asia, and *C. oleraceum* O. Prain, a tree cultivated in the Congo (= *C. africanum* p.p.).

*a cult.* *Claytonia perfoliata* Donn. ex Willd. = *Montia perfoliata* How. (Portulacaceae); Winter purslane.

Vegetable resembling purslane. Related is *C. exigua* Torr. et Gray from Chile.

*A* *Cleome* species (Capparidaceae) such as *C. monophylla* L., *C. ciliata* Schum. et Thonn., *C. icosandra* L., *C. strigosa* Oliver, *C. viscosa* L., *C. hirta* Oliver.

Herbaceous weeds, the bitter tops and leaves of which are eaten. *C. speciosa* DC, an ornamental, is also eaten. Protein content of *C. viscosa* (= *Polanisia viscosa*) 5.6%, of *G. gynandra* 3.5-6%; the latter is cultivated as a vegetable in Malaya. Also on the *compounds*.

*A cult.* *Cleome gynandra* L. (= *Gynandropsis gynandra* Briq. = *G. pentaphylla* A.DC).

An ornamental plant with big, lilac or white flowers; also the young pods are eaten. The leaves are rich in methionine.

*A cult.* *Clitoria terneata* L. (Leguminosae).

Green manure plant of which the young leaves and shoots can be eaten (3.8%).

*AC cult.* *Coccinia cordifolia* Cogn. = *C. indica* W. et A. (Cucurbitaceae) = *Cephalandra indica* Naud.; Ivy gourd, Small gourd.

Perennial climber with tendrils, of which the young leaves and shoots and also the young fruits (1.2%) are eaten. The fruits of the wild forms are often very bitter, but in South-India many good commercial forms with long, less bitter fruits, are to be found. Propagated by cuttings. Suitable for the *compounds*. Another name is *C. grandis* J. G. Voigt. The leaves of *C. rehmannii* Den are eaten too.

*AC cult.* *Cocos nucifera* L. (Palmae); Coconut palm; Cocotier (Fr.); Cocotera (Sp.).

Very important palm with the well-known fruits, the fresh flesh of which is eaten; the flesh is also grated and pressed and the coconut milk, which is obtained in this way, is used in many dishes and sauces. The palm cabbage is edible (1.7%) and also the young flowers. The fruit flesh contains 4% protein, the "milk" 3%, the water 0.3%.

The palm cabbage (the vegetation point with the surrounding leaf initials) serves as a vegetable. Suitable for the *compounds*. The protein of the fruit flesh is usually lost when only the milk is used. It is better to cook the grated matter along with the various dishes.

*A cult.* *Codiaeum variegatum* Bl. (Euphorbiaceae); Croton.

Shrub or arborescent shrub with shining, multi-coloured leaves, the colour

ranging from green to yellowish red; the top shoots are eaten. Protein content 5%. Propagated by cuttings. Often on the *compounds*.

*Coleus amboinicus* Lour. (Labiatae).

AD cult.

The leaves of *C. amboinicus* (= *C. aromaticus* Benth.) (0.9%), are eaten just like those of *C. tuberosus* Benth. Also the tubers of *C. rotundifolius* Chev. et Perr. (= *C. dysentericus* Bak. = *Plectranthus tuberosus* Blume = *P. rotundifolius* Spreng.), also known as *C. rotundifolius* J. K. Morton (tuber 1.3%), of *C. esculentus* Chev. (= *P. floribundus* Rob. et Lebrun) and of *C. daro* Chev. (= *C. esculentus* (N. E. Brown) G. Tayl.) now also known as *P. esculentus* N. E. Brown.

Important is:

*C. tuberosus* Benth.

D cult.

Ascending herb forming root tubers; the stems are square and the flowers dark red. The black root tubers are eaten, and sometimes also the leaves. Propagated by cuttings of 10 to 20 cm or by the young tubers, which are planted out at 30 to 50 cm; earthing up follows. Protein content 0.5-1.9%. Especially in Africa many other *Coleus* species are known.

*Colocasia esculenta* Schott. = *C. antiquorum* Schott. (Araceae); Cocoyam, Dasheen, Taro; Arouille, Colocase, Taro (Fr.); Malanga, Nampi, Bore (Sp.). A very important plant with peltate leaves without a marginal vein; it forms stem tubers and contains a watery-milky juice. The big stem tuber, the often small lateral tubers formed on the runners, and the young leaves and leaf stalks are eaten. The leaves may be eaten like those of Amaranth, but they are somewhat slimy. Propagation takes place by the use of small tubers or, if these have not been formed, by the top parts of the big tubers. They are planted out at distances of 60-90 cm by 80-100 cm. It runs seldom to seed. In many regions the big stem tubers are the staple food but they may also be used as a supplement when cooked or fried, in soups and sauces.

AD cult.

The plant can stand both water logging and shadow; therefore, it is suitable for the *compounds*. Protein content of the leaves 3.5-7%, of the stalks 0.3-1.5%, of the tubers 1.3-3%.

Furthermore, we have *C. gigantea* Hook. f. (India), containing a white, milky juice; it is rarely eaten because of its content of oxalate crystals, but it seems there are some varieties of which the peeled stalks are eaten, either raw or cooked (0.4%). Next, there is the wild *C. indica* Hassk.

AD

*Corchorus* species (Tiliaceae) such as *C. acutangulus* Lam., *C. capsularis* L., *C. olitorius* L., *C. tridens* L., *C. trilobularis* L.; Jute; Jute (Fr.); Yute (Sp.).

C cult.

These names apply particularly to *C. olitorius* and *C. capsularis*. The vegetable is called Jute mallow or Jew's mallow (French: Corette potagère), which names apply particularly to *C. olitorius*.

Important annual plants with erect stems and yellow flowers. They resist rain and water logging and are sown at the beginning and the end of the rainy season. They are sown densely (for the young plants) or they are thinned out on beds at 15 cm or transplanted at 45 cm. The young leaves and stem tops are eaten in the same way as Amaranth, but they are slimy



6. *Corchorus olitorius* L.

and therefore very suitable for certain thick sauces. Seed growing is easy. Also suitable for the *compounds*. Protein content of the very young leaves 1.5%, of the older ones 5-6%. Protein content of *C. acutangulus* 6.1%, of *C. capsularis* 5.1%.

*Cordia* species (Boraginaceae) such as *C. myxa* L. (4.7%), *C. olitoria* Blanco, *a cult.*  
*C. francisci* Ten., *C. obliqua* Willd.

The young leaves of these trees are eaten e.g. in the Near-East. The fruits of *C. religiosa* Forst. (= *C. adansonii* Olw.) are eaten roasted.

*Cordyla pinnata* Milne Redhead (Leguminosae).

African tree of which the young fruits are eaten, boiled or fried, in the couscous; the ripe fruits are eaten as such.

*Cordylone fruticosa* A. Chev. (= *C. tomentosa*) (Liliaceae). *A cult.*

Shrub of which the young leaves, still furled, are eaten. Suitable for the *compounds*.

*Coriandrum sativum* L. (Umbelliferae); Coriander; Coriandre (Fr.); Coriandro (Sp.) *A cult.*

Aromatic herb, of which also the leaves are used as a seasoning (3.3%). Suitable for the *compounds*.

*Cosmos* species (Compositae) such as *C. caudatus* H.B.K. and *C. sulphureus* Cav. *A cult.*  
Herbaceous weeds with pink (*C. caudatus*) or yellow (*C. sulphureus*) flowers; the leaves (2.9%) are eaten raw or cooked, especially those of the first-mentioned species.

*Crambe cordifolia* Steven (Cruciferae). *a cult.*

Perennial herb from the highlands of Asia Minor, India and Ethiopia, grown for the young leaves. Known is also *C. tatarica* Jacq.

*Crambe maritima* L. (Cruciferae); Sea kale; Chou marin (Fr.); Col de mar (Sp.) *a cult.*

Perennial herb, grown along the Atlantic and Mediterranean European coasts, for the young leaves (2-3.5%).

*Crassocephalum bialfrae* S. Moore (also mentioned as *Gynura* and *Senecio*) (Compositae). *A cult.*

Herb from West-Africa of which several forms are known e.g. low and high growing ones. Also grown and eaten are the leaves of *C. crepidioides* S. Moore, *C. vitellinum* S. Moore and of *C. rubens* S. Moore (= *Gynura cernua* Benth.). The leaf is rich in methionine.

*Crotalaria* species (Leguminosae) such as *C. longirostrata* Hook. et Arn. and also *C. ashrek* Forst., *C. glauca* Willd., *C. juncea* L., *C. retusa* DC and sometimes *C. intermedia*. *A cult.*

Herb of which the young tops, pods and leaves (7% in the case of *C. longirostrata*) are eaten cooked. Usually only the flowers are eaten of *C. intermedia*. The seeds are poisonous. With most of the *Crotalaria* species care should be taken, because they have toxic properties. The flowers of *C. juncea* have 4.8% protein and they are eaten. Some *Crotalaria* species are used to eliminate nematodes by field rotation.

*Cubilia blancoi* Bl. (Sapindaceae). *A cult.*

Fruit tree of the Philippines, of which, besides the nuts, also the young leaves and shoots can be eaten.

*B cult.* *Cucumeropsis* species (Cucurbitaceae) such as *C. mannii* Naudin = *C. edulis* Cogn. and *C. metuliformis* E. Mey.

Annual, creeping plant with deeply incised leaves and almost spherical fruits. The seeds are rich in protein and they are eaten in all kinds of dishes. Grown against fences and suchlike, but also creeping. Suitable for the compounds.

*C cult.* *Cucumis anguria* L. (Cucurbitaceae); Anguria cucumber, West-Indian gherkin; Concombre des Antilles, Concombre cornichon (Fr.); Pepino, Pepinito (Sp.).

Important annual climber with tendrils, incise leaves, yellow flowers and oval, warty or spiny, white-fleshed, long-stalked fruits which are eaten when unripe (1.4%). Grown like *C. sativus* especially in the Caribbean region.

*BC cult.* *Cucumis melo* L. (Cucurbitaceae); Cantaloupe, Musk melon; Melon (Fr.); Melón (Sp.).

Important annual climber with tendrils, yellow flowers and big, roundish fruits which are a light green or yellowish red inside. It is rather a fruit than a vegetable. Only the ripe fruits are eaten (0.6-1%) and in Africa also the seeds which are probably rich in protein. This plant is usually grown creeping. Just like *C. sativus* it does not stand rain well. Batches of 2 or 3 seeds are sown at distances of 1-2 m in a row, the rows being 2-3 m apart; or one plants at 1 m. Sowing preferably to be done on rich soils, which hold the moisture well. Seed required per ha: 1.5-2.5 kg, if transplanted, otherwise 2-4 kg.

*AC cult.* *Cucumis sativus* L. (Cucurbitaceae); Cucumber, Gherkin; Concombre, Cornichon (Fr.); Cohombro, Pepino (Sp.).

Important annual climber with tendrils and yellow flowers; the fruits are mostly oblong, warty and somewhat prickly when unripe, greenish white inside. Usually the unripe fruits are eaten, but also the leaves and stem tops. Protein content of the leaves about 2-3.5%, of the young fruit 0.3-0.7%.

The forms with small fruits are always grown creeping. Batches of 2 or 3 seeds are put 40-60 cm by 1.5-2 m apart. Sowing is done by the end of the rainy season, because, again, rain is not well tolerated by most of the forms. Seed required per ha: 2-2.5 kg. The forms with big, oblong fruits are sometimes grown against trellises. In India mention is made of *C. madaraspatamus* and *C. utilissimus*. In Africa the leaves of *C. africanus* Lindl., *C. agrestis* Creb., *C. dipsaceus* Spach, *C. ficifolius* A. Rich., *C. hirsutus* Sond. and *C. prophetarum* L. are eaten.

*C cult.* *Cucurbita moschata* Duch. ex Poir. (Cucurbitaceae), *C. maxima* Duch. and *C. pepo* L.; Chinese pumpkin, Gourd, Pumpkin, Squash, Vegetable marrow; Courge (musquée), Citrouille, Potiron (Fr.); Calabaza (Sp.).

Important annual climber with tendrils, yellow flowers and multiform, mostly ribbed, flat or round fruits, which are greenish to orange-yellow

inside. The leaves are either deeply lobed (*C. pepo*), not lobed at all (*C. maxima*) or in between (*C. moschata*). The young tops and leaves are eaten, as well as the unripe or half-ripe fruits and sometimes the flowers and the ripe seeds. Suitable for moderately fertile soils. Grown creeping (in this case batches of seeds are put at distances of 2.5 m) or climbing against trees, fences, barns etc. (in this manner they are suitable for the *compounds*). Suitable for the somewhat moisture holding soils in the dry season, but it can also stand some rain. Seed required per ha: 2.5-3.5 kg. Protein content of the leaves 2-6%, of the flowers 2.2%, of the young fruits 0.3-1.7%, of the ripe ones 0.5-1.5%, of the seeds 26-30%. The seeds of *C. pepo* are rich in methionine. *Cucurbita melo-pepo* L., a.o. Zucchini, a form of *C. pepo*, has deeply lobed leaves.

*Curcuma aurantiaca* van Zijp (Zingiberaceae).

A

Perennial herb used as a condiment and as a vegetable (leaf sprouts). *C. amada* is also used as a condiment.

*Curcuma longa* Auct. (Zingiberaceae) = *C. domestica* Val.; Turmeric.

A cult.

Perennial herb of which the orange-coloured rhizomes are used as a seasoning; the spicy young tops of the rhizomes and the young shoots are also eaten. Protein content of the young rhizomes: 2-4%.

*Curcuma mangga* Val. et van Zijp (Zingiberaceae).

A cult.

Perennial herb of which the spicy young rhizome tops and the young shoots are eaten.

*Curcuma xanthorrhiza* Roxb. (Zingiberaceae).

A cult.

Perennial herb; the young tops of the rhizomes, the inflorescences and the heart of the spurious stems are eaten; the rhizomes are normally used for medicinal purposes, but occasionally for making flour.

*Curcuma zedoaria* Rosc. (Zingiberaceae).

A cult.

The heart of the spurious stems of this perennial herb is eaten.

*Cyamopsis psoraloides* DC (= *C. tetragonolobus* Taub.) (Leguminosae); Cluster bean, Guar; *Cyamopse à quatre ailes* (Fr.).

B cult.

High growing, annual or perennial legume with violet-white flowers and racemes of hairy pods. The young leaves, the young pods and the ripe seeds (with a very small, concave hilum) are eaten. Sown at 30-45 cm; 2 kg per ha. The leaves and the young pods contain 3-4% protein, the ripe seeds 30%. Suitable for the *compounds*. Sometimes the leaves of *C. senegalensis* Cyr. et Peir, are eaten.

*Cyclanthera pedata* Schrad. (Cucurbitaceae).

A cult.

Climber, grown for the young fruits (0.6%) and shoots in Mexico.

*Cynara* species (Compositae) such as *C. cardunculus* L. and *C. scolymus* L.; Cardoon, Artichoke; Cardon, Artichaut (Fr.); Cardo, Alcochofa (Sp.).

a cult.

High growing herbs. Of the first-mentioned the thickened young leaf nerve (0.5%) and of the second the inflorescence with bracts (1.5-3%) are eaten. Suitable only for the high belts or for the subtropics.

*Cymbopogon citratus* Stapf. (Gramineae).

A cult.

Perennial grass, used for seasoning.

- D cult.* *Cyperus esculentus* L. (Cyperaceae); Tiger nut; Souchet comestible (Fr.).  
Sedge grass with small stem tubers (3-4.5%), which are eaten just like those of various troublesome grass weeds: *C. rotundus* L., *C. diffusus* Vahl., *C. articulatus* etc.
- A cult.* *Cyphomandra betacea* Sendt. (Solanaceae); Tree tomato.  
Half-shrub; the content of the berries is eaten, mostly prepared like a kind of apple-sauce. Rather a fruit than a vegetable. Preferably at higher altitudes. Very superficially rooted, it does not stand hoeing for weeding.
- D cult.* *Cyrtosperma chamissonis* Merr. (Araceae).  
High growing plants with sagittate leaves and big, slowly growing tubers (Polynesia); the tubers are poor in protein (0.7-1.4%) and usually flour is made of them. It can stand much water and shadow. The protein of *C. merkusii* Schott. amounts to 0.8-1.4% (tuber), 2.4% (flower) and 5% (leaf without stalk or central nerve). The leaves of *C. senegalense* Engl. are also used in sauces (Gabon, Sierra Leone).
- AD cult.* *Daucus carota* L. (Umbelliferae); Carrot; Carotte (Fr.); Zanahoria (Sp.).  
Herb with finely divided leaves and yellow or orange-red taproots, which are eaten as vegetables. Protein content 1%. The culture is also possible in the lowlands on moderately fertile soils. Shade may be desirable. Seed required per ha: 5-10 kg, broadcast or in rows at 30 cm, not to be transplanted. Sometimes the leaves (5.1%) are also eaten (India).
- A cult.* *Desmodium cinereum* DC (Leguminosae); Trebol, Hierba del angel (Sp.).  
Green-manure plant, of which the young leaves and shoots can be eaten (5.8%) like those of *D. umbellatum* DC, a shrub from Indonesia. *D. cinereum* is grown as a vegetable in South-America.
- D cult.* *Dioscorea* species (Dioscoreaceae) such as *D. alata* L., *D. cayenensis* Lam. = *D. rotundata* Poir., *D. esculenta* Burk., *D. trifida* L.f., *D. pentaphylla* L.; Elephant yam; Igname (Fr.); Name (Sp.).  
Very important climbers with curved, parallel nerves and with heart-shaped or compound leaves (*D. trifida*, *D. pentaphylla*, *D. hispida*). The root tubers and the bulbils are eaten, but never leaves nor shoots. Suitable for the compounds. Most often the tubers are used as a staple food but they may serve as a supplement, when cooked or fried, in soups and sauces. Some species have toxic properties (*D. hispida*). Propagation by means of the tuber tops (up to 5000 kg per ha) or shoots with bulbils or the bulbils themselves. Protein content 1.3-4.5%.
- AB cult.* *Dolichos lablab* L. (Leguminosae) = *Lablab vulgaris* Medic.; Bonavist bean, Hyacinth bean; Antaque, Dolique d'Egypte (Fr.); (Dolicho) lablab (Sp.).  
Important, annual or perennial, climber. The flowers are white or vary from pink to violet; the pods are glabrous, somewhat curved, mostly flat and beaked; the seeds have a hilum covered by a protruding white ridge. The young shoots and leaves, the young pods and the ripe seeds are eaten. Seed required per ha: 20-60 kg, sown at 30-150 cm. Also suitable for the compounds. Protein content of the leaves is 3% and of the young pods 2.8-

- 3.4%, of the young seeds 8.3% and of the ripe seeds about 25%. The flowers of *D. buchananii* Harms are eaten and so are the tubers of *D. esculentus* de Wild. *Dolichos bracteatus* Baker (Leguminosae). AB cult.
- Climbing kind of beans with purple flowers; the young pods are eaten (India). Also bushy forms occur. The climbing form is grown on stakes spaced at 60–80 cm or against fences etc., but also creeping. Seed required per ha: 25–50 kg. The plant is somewhat drought resistant and suitable for the compounds. The young seeds of *D. sphaerospermus* are eaten.
- Dracaena* species (Liliaceae) such as *D. mannii* Baker, *D. angustifolia* Lam., *D. reflexa* L., *D. thalioides* Ch. Morren. C cult.
- The very young leaves are eaten in parts of Africa.
- Durio zibethinus* Murr. (Bombacaceae); Durian; Durian (Fr.). A cult.
- Very high fruit tree from the wetter parts of South-East-Asia; the young leaves and shoots are sometimes eaten too. Suitable for large compounds.
- Elaeis guineensis* Jacq. (Palmae); Oil palm; Palmier d'huile (Fr.); Palma de aceite (Sp.). C cult.
- Very important palm with racemes of yellowish black fruits, the outer layer of which yields oil. The oil is used for the preparation of all kinds of dishes; the locally processed oil is usually orange-red, and in that case very rich in carotene (provitamin A). The palm cabbage is also edible. Suitable for the compounds.
- Eleusine coracana* Gaertn. (Gramineae); Finger millet, African millet. AD cult.
- A millet of which the young plants are often eaten, preferably raw. Also the young plants of *E. indica* Gaertn. are eaten, either raw or cooked.
- Emilia* species (Compositae) such as *E. sagittata* DC = *E. coccinea* G. Don = *E. flammea* Cass. and *E. sonchifolia* A.DC. A
- Herbaceous weeds with light-red flowers; often eaten as a whole. Runs often wild in the compounds. The first-mentioned species is rich in methionine.
- Erechtites* species (Compositae) such as *E. hieracifolia* Rafin. ex DC, *E. valerianae-folia* A.DC. A
- Herbaceous weeds with light-yellow flowers for the first-mentioned species and light-violet ones for the other; the tops are eaten raw or cooked (2%). Runs often wild on the compound.
- Eruca sativa* Mill. (Cruciferae); Roquette, Garden Rocket. a cult.
- Subtropical herb, eaten as a vegetable (3–4%), in the Near-East, with a pungent taste. Grown like turnips and mustard.
- Eryngium foetidum* L. (Umbelliferae). A cult.
- Of this pantropical herb the young leaves (2.3%) are eaten, like those of *E. floridanum* Coult. (2.3%) from Central America and *E. creticum* Lam. (2.3%) from the Near-East.
- Erythrina* species (Leguminosae) such as *E. berteroana* Urb., *E. subumbrans* Merr., *E. variegata* L., *E. fusca* Lour., *E. lithosperma* Miq. A cult.
- Small trees; the young tops and leaves (and even the practically full-

grown leaves of *E. variegata* var. *orientalis* = *E. indica* Lam.) are eaten. Protein content 4-5% (*E. berteriana*). Suitable for the compounds.

*d cult.* *Escobedia scabrifolia* R. et P. (Serophulariaceae).

Roots are used as spice and as colouring matter (Peru).

*A cult.* *Eugenia (Syzygium) malaccensis* L. (Myrtaceae); Malay apple; Poire de Malaque (Fr.).

Of this fruit tree the young leaves and shoots can be eaten, like those of *E. polycephala* Miq., a fruit tree, and those of *E. lineata* Duthie, *E. duthieana* King (1.9%) and *E. polyantha* Wight, the latter dried as a condiment. Nowadays, they are all known as *Syzygium*. The leaves have a marginal vein. Suitable for the compounds.

*A* *Euphorbia heterophylla* L. (Euphorbiaceae).

Herbaceous weed with hollow stems, which contain a milky juice; the tops of the flowering shoots have red or yellow leaves. The young tops and leaves are eaten cooked and probably they are rich in protein. Runs often wild, also on compounds.

*Euphorbia edulis* Lour. is grown in Indochina for the leaves, as is *E. hirta* (4.7%) in India. *E. nerifolia* L. is eaten as a sweetmeat in Malaya, after preparation of the leaves, just like *E. trigyna* Haw. and *E. antiquorum* L. by the Chinese of Java.

*A cult.* *Euphorbia pulcherrima* Willd. (Euphorbiaceae); Poinsettia; Euphorbe écarlate (Fr.); Flor de pascua (Sp.).

Shrub containing a milky juice, with yellow or red upper leaves (when flowering); easy to propagate by means of cuttings. Planted some metres asunder, alone or in hedges and fences. Suitable for the compounds. Drought resistant. The young tops, leaves and inflorescences are eaten, but not the fruits; the leaves etc. should not be eaten raw. Their protein content is 6-7%.

*a cult.* *Fagopyrum tataricum* Gaertn. (Polygonaceae); Buckwheat.

The leaves of this temperate crop are eaten in India, like those of *E. cymosum* Meissn.

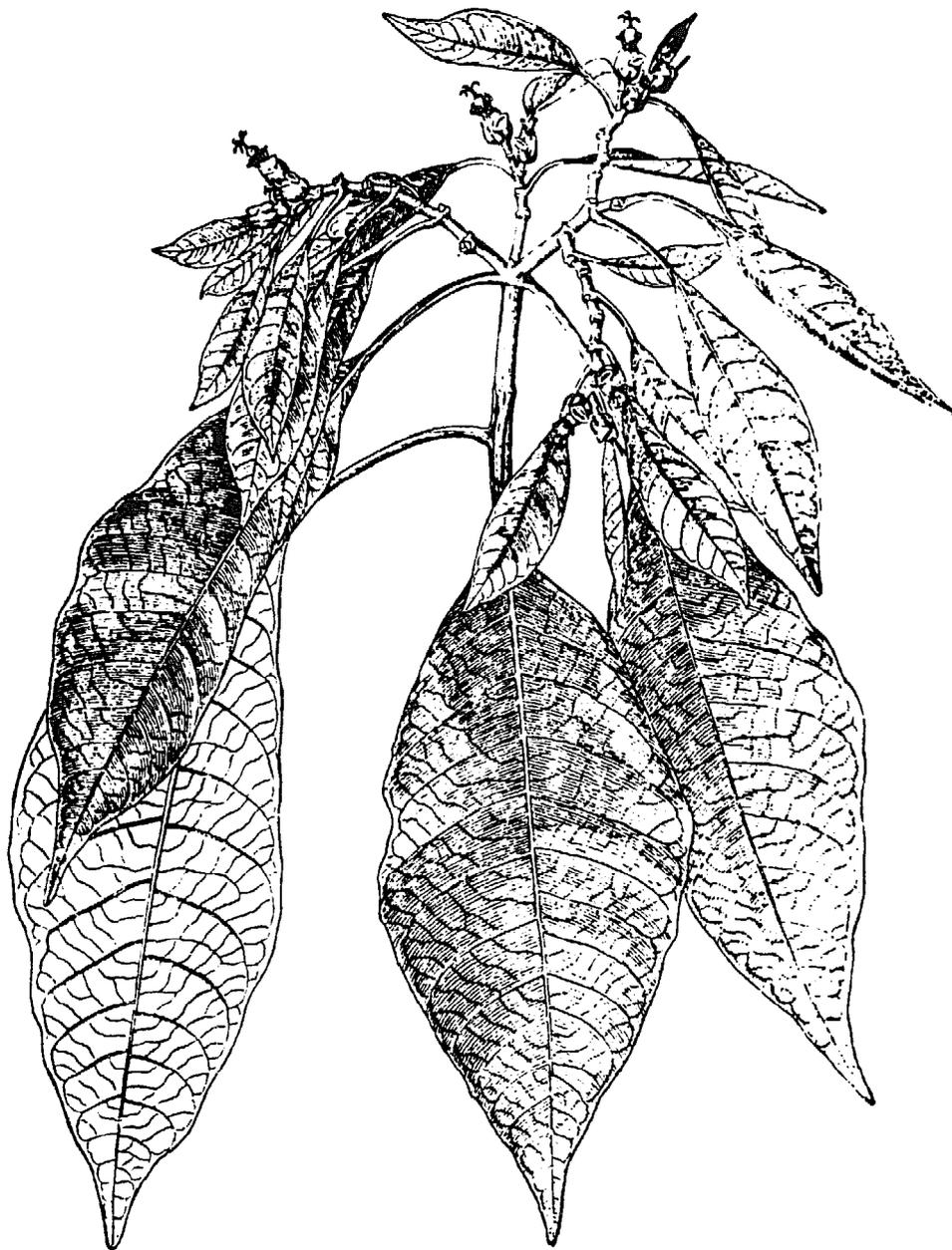
*A* *Ficus* species (Moraceae) such as *F. alba* Reinw., *F. annulata* Bl., *F. capensis* Thunb., *F. conora* King, *F. dammaropsis* Diels, *F. elastica* Thunb., *F. fistulosa* Reinw., *F. glabella* Bl., *F. glomerata* Roxb., *F. glumosa* Del., *F. gnaphalocarpa* Steud., *F. hirta* Vahl, *F. infectoria* Roxb., *F. ingens* Miq., *F. lepicarpa* Bl., *F. mucosa* Welw., *F. polita* Vahl, *F. quercifolia* Roxb., *F. rumphii* Bl., *F. superba* Miq., *F. variegata* Bl.

Fig trees; all of them contain a milky juice; the leaves, tops and young fruits are eaten as vegetables. Of *F. elastica* only the young tops. A protein content of 6.1% is given for the leaves of one of the species.

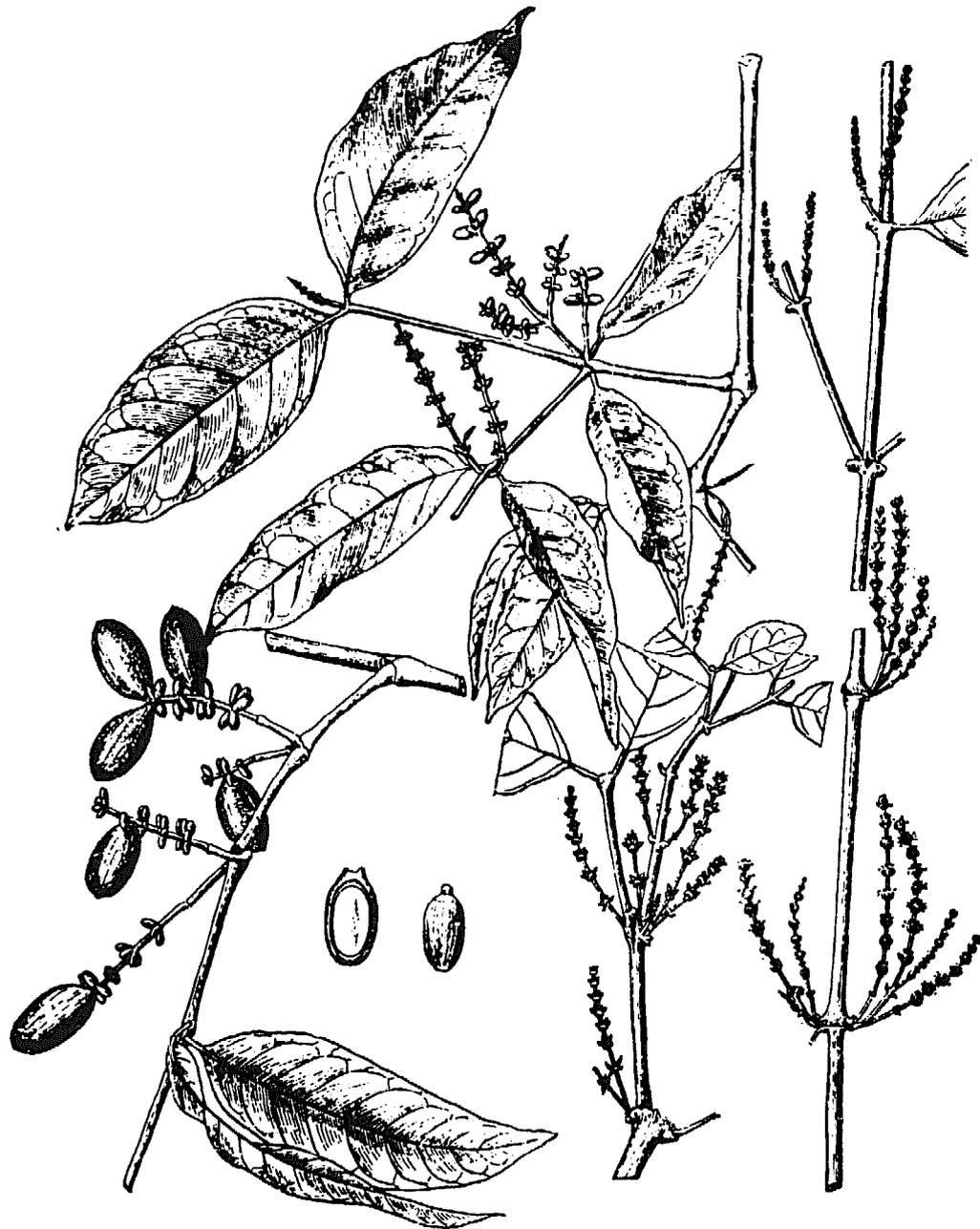
*A cult.* *Flacourtia rukam* Zoll. et Mor. (Flacourtiaceae).

Of this fruit tree and some of its congeners in Indonesia and India, e.g. *F. jangomas* Baeusch, the young leaves and shoots are eaten.

*A cult.* *Foeniculum dulce* (Umbelliferae) = *F. vulgare* Mill.; Fennel; Fenouil (Fr.); Hinojo (Sp.).



7. *Euphorbia pulcherrima* Willd.



8. *Gnetum gnemon* L.

Herb of which the spicy leaf (2.8–4.2%) and especially the thickened base of the rosette (1.1%) are used as vegetables, mostly raw.

*Garcinia* species (Guttiferae).

A cult.

Of *G. atroviridis* Griff. in Malaya, the young shoots (1.8%) can be eaten, but mostly the young fruits. Also young leaves and shoots of *G. microstigma* Kurz. (Burma), *G. dioica* Bl. (South-East-Asia), *G. cowa* Roxb. (India, Thailand), *G. amboinensis* Spreng. (= *G. cochinchinensis* Choisy) (South-East-Asia) and *G. sizygifolia* Pierre (South-East-Asia). Suitable for compounds.

*Glochidion blancoi* Lowe (Euphorbiaceae).

A cult.

Tree, cultivated in the Far-East and in the Philippines for the young leaves and shoots; also often used as a flavouring. The same is true of the leaves and young shoots of *G. borneense* Boerl. and *G. rubrum* Bl., both of them trees from South-East-Asia.

*Glycine max* Merr. (Leguminosae); Soybean; Soya (Fr., Sp.).

AB cult.

Very important, annual, creeping herb with small, insignificant, white or lilac flowers; the pods are hairy and slightly curved; the seeds have a flat, elliptical hilum; the young pods and the ripe seeds are eaten, sometimes also the young leaves. Batches of 2 or 3 seeds are sown 15–30 cm apart. The leaves contain 6% protein, the young seeds 9–12% and the ripe seeds 38%. The ripe seeds are also suitable for making taogé (bean sprouts); the protein content of these sprouts is 2.3–9%. Moreover, the leaves of *G. japonicum* L. and *G. laurentii* de Wild. too are eaten.

*Gnetum gnemon* L. (Gnetaceae); Joint fir.

ABC cult.

Important, usually low growing tree, which resists a drought of three months; the young shoots, the young leaves, the young inflorescences resembling bunches of grapes, especially with the young fruits on them and the unripe and ripe fruits and seeds are eaten. The trees are male or female. The seeds are often hard-coated, they germinate only after six months; therefore, they have to be filed before germination. The trees are spaced at 6 m. They blossom the whole year round. They can stand shadow and so are suitable for the compounds. The protein content of the leaves is 4–6%, of the flowers 5%. The ripe fruits are flattened and fried in oil. African edible *Gnetum* species are: *G. africanum* Welw., of which the leaves and seeds are eaten (Ubangi, Gabon, Congo, Angola) and *G. buchholzianum* Engl.; both are lianes. Moreover, *G. tisserantii* (Gabon) and *G. indicum* Merr. (= *G. latifolium* Blume p.p.) are eaten and, as far as we know, only the seeds of *G. gnemonoides* Brongn.

*Gomphrena globosa* L. (Amaranthaceae).

A cult.

The leaves of this ornamental herb are eaten. Often wild on the compounds.

*Gundelia tournefortii* L. (Compositae).

c cult.

Herb grown in the Near-East, of which the leaves are eaten (1.1%).

*Gymnema syringefolium* Boerl. (Asclepiadiaceae).

A cult.

This climber is cultivated in Malaya for the young leaves and shoots (3%).

In Africa the leaves of *G. sylvestre* R.Br. are eaten; they are said to destroy the taste of sugar for one day (Congo).

*A cult.* *Gynandropsis gynandra* Briq. See *Cleome gynandra* L.

*A cult.* *Gynura cernua* Benth. (Compositae). See also *Crassocephalum rubens* S. Moore. Herb cultivated in parts of West-Africa for the leaves. Also eaten are: *G. procumbens* Backer and *G. sarmentosa* DC, both herbs from Indonesia.

*D* *Halopogon blumei* K. Schum. (Marantaceae).

Herb with small, edible tubers.

*D cult.* *Heleocharis dulcis* Trin. (Cyperaceae); Water chestnut.

Sedge growing in water and forming small tubers, which are eaten cooked or fried. Protein content 1.4-2.6%.

*D cult.* *Helianthus tuberosus* L. (Compositae); Jerusalem artichoke; Topinambour (Fr.); Alcachofa de Jerusalem (Sp.).

Perennial plant with yellow flowers and thick rhizomes, which may serve as a supplementary food in soups and sauces. Protein content of the rhizome 1.4-2.6%.

*D* *Heliconia brevispatha* Hook. (Musaceae); Bird of Paradise.

Herb with tubers (4%).

*A cult.* *Hibiscus abelmoschus* L. (Malvaceae) = *Abelmoschus moschatus* Medic.; Musk mallow; Ambrette (Fr.); Ambarina (Sp.).

Young tops and leaves are harvested from this annual plant (South-East-Asia, West-Africa), as well as from many other species such as: *H. acetosella* Fic., *H. articulatus* A. Rich., *H. asper* Hook. f., *H. cannabinus* L., *H. ficulneus* L., *H. furcatus* Willd. (= *H. hispidissimus* Griff.), *H. gilleti* de Wild, *H. intermedius* A. Rich., *H. lancibracteatus* de Wild et Th. Dur., *H. physaloides* Guill. et Perr., *H. radiatus* Cav., *H. rosa-sinensis* L. (1.2%), *H. roselloides* L., *H. rostellatus* Guill. et Perr., *H. surattensis* L. The tubers of *H. cancellatus* Roxb. (1.9%) are eaten in India.

*A cult.* *Hibiscus eetveldianus* de Wild. et Th. Dur. (Malvaceae).

Annual shrub with wine-red flowers, propagated from seed and cuttings. The young tops and leaves are sour; so they are eaten like sorrel, also mixed with other vegetables. Suitable for the compounds.

*AC cult.* *Hibiscus esculentus* L. (= *Abelmoschus esculentus*) (Malvaceae); Gombo, Lady fingers, Okra; Gombo (Fr.); Quingombo (Sp.).

Very important annual herb with light-green leaves, which may be hairy or glabrous; the yellow flowers have red hearts; the fruits are ribbed. The pointed young fruits and sometimes also the leaves, shoots and flowers are eaten. Also suitable for the compounds.

Suitable for all fertile and moderately fertile soils. Seed required per ha: 8-10 kg. Planted preferably in the rainy season; spacing varies from 0.6 × 1 m to 1.2 × 1.5 m. Either sown in batches of 4 or 5 seeds or transplanted (30 to 60 cm). After 2-3 months harvesting begins and continues for 3-4 months or even longer. The young fruits are slimy. They are suitable for consumption as long as they are easily broken off. The mucosity dis-



9. *Hibiscus esulentus* L.

appears through frying in fat or oil. If the fruits are left on the plant to ripen, further fruiting stops. Protein content of the leaves 2.7-3%, of the young fruits 1.6-2.2%.

*A cult.* *Hibiscus manihot* L. (Malvaceae) = *Abelmoschus manihot* Med.; Sunset hibiscus; Gédi (Indonesia).

Annual or perennial half-shrub having sulphur-yellow, sometimes white flowers with dark-red hearts. There are various varieties, which differ strongly in the form of the leaves. In the tropics it rarely flowers; it is then perennial. Propagated from cuttings. The slimy leaves as well as the young tops are eaten raw or cooked. The plant is suitable for compounds and fences. The protein content is 2.7%.

*A cult.* *Hibiscus sabdariffa* L. (Malvaceae); Roselle; Oseille de Guinée (Fr.); Sereni (Sp.).

Annual, erect herb with yellow flowers and sour leaves. The young tops, the leaves (1.7-3.2%) and the sour, white or red calix (1.6%) are eaten. Propagated from seed and planted at 1.5 m. First harvest after 3-4 months.

*A cult.* *Hydrocotyle asiatica* L. (Umbelliferae), also called *Centella*.

Perennial, creeping weed, grown for the leaves and runners, which are eaten raw (2-2.3%); in Malaya grown on moist soil. Also eaten are the raw leaves of: *H. javanica* Thunb. (1.2%) in Java and *H. sibthorpioides* Lam. in South-East-Asia. *H. javanica* is said to be somewhat poisonous; the seeds should not be eaten.

*A cult.* *Hyptis spicigera* Lam. (Labiatae).

Cultivated as a potherb in Africa. Also used are: *H. brevipes* Poir. and *H. suaveolens* Poir. from India, Thailand and Indochina, and *H. pectinata* Port. from Africa.

*C cult.* *Inga edulis* Mart. (Leguminosae).

This and other trees of the genus *Inga* have edible pods (Mexico).

*A cult.* *Indigofera arrecta* Höchst.

The young leaves and shoots of the indigo plant are eaten.

*AD cult.* *Ipomoea batatas* Poir. (Convolvulaceae); Sweet potato; Patate douce (Fr.); Camote, Batatas (Sp.).

Important creeper which forms tubers; the flowers are a light red to purple; not only the tubers but also the young leaves and stem tops are eaten. The tubers may serve as a supplement, but usually they are the staple food. Propagated from cuttings or tubers at 30-60 cm. These should not be from small, pale or curly plants. For its leafy parts, the plant does not require much, but for the tubers it does. Protein content of the leaf 1.8-4.3%, of the tubers 0.5-2%.

*A cult.* *Ipomoea reptans* Poir. (Convolvulaceae) = *I. aquatica* Forsk.

Known in South-East-Asia as kankong; Swamp cabbage, Water spinach; Patate aquatique, Liseron d'eau (Fr.).

Important creeper, resembling *I. batatas*, with light-red flowers and hollow stems. Most forms grow best in water, but there are also forms, which



10. *Ipomoea reptans* Poir.

grow very well on dry land; they are raised on beds, spaced at 40 cm. After 6 weeks, the harvest may begin and, with sufficient water, it may continue for the whole year. Propagated by means of top cuttings of 25-40 cm or from seed. Protein content 1.9-4.6%. Suitable for the *compounds*. When grown in water, the yield may amount to as much as 60,000 kg per ha. There are also wild forms with narrow leaves.

*A cult.* *I. involucrata* Beauv. is another edible *Ipomoea*. Also eaten are: *I. alba* L.f. (= *Calonyction aculeatum* Choisy) (leaves and calix), *I. biloba* Forsk., *I. bona-nox* Boj. (= *Calonyction bona-nox* = *C. muricatum*), *I. cairica* Sweet (= *I. palmata*), *I. cordofana* Choisy, *I. sepiaria* (= *I. maxima*) (India) with 1.3% protein (also flowers) and *I. digitata* L. with 4% protein. Mention is also made of: *I. eriocarpa* R.Br. (= *I. hispida*), *I. illustris* Prain, *I. lugardi* N.E.Br. and *I. uniflora* Roem. et Schult., all of them from India.

*A cult.* *Jatropha urens* L. (Euphorbiaceae).  
Shrub grown for the leaves (Philippines), propagated from cuttings. The leaves and young shoots of *J. curcas* L. are eaten too, like those of *J. aconitifolia* (6.2%) = *Cnidoscolus aconitifolia*, and *J. multifida* L.

*A cult.* *Justicia insularis* T. And. (Acanthaceae).  
Herb, cultivated in West-Africa for the leaves. Eaten are also: *J. flava* Vahl., *J. galeopsis* T. And., *J. glabra* Koen. ex Roxb., *J. melampyrum* S. Moore, *J. pectoralis* Jacq. = *Dianthera pectoralis* (3.9%) and *J. rostellaria* Lindau, all of them herbs from Africa, except the second (South-East-Asia) and the last but one (also Mexico). In India are eaten: *J. procumbens* L. and *J. quinque-angularis* Koenig.

*AD cult.* *Kaempferia galanga* L. (Zingiberaceae).  
The rhizomes and leaves of this low-growing, perennial herb are eaten.

*AD cult.* *Kaempferia pandurata* Roxb. (Zingiberaceae), sometimes known as *Gastrochilus panduratus* Ridl.  
Perennial herb, of which the young roots, leaves and shoots are used as a seasoning. This is also true of *K. rotunda* L. Protein content of the shoots 1%.

*A cult.* *Lactuca indica* L. (Compositae).  
Erect, annual herb, containing a milky juice; the flowers are a bright yellow; the leaves are eaten as a salad; raised on beds 75-100 cm apart, or running wild in the *compounds*. Sometimes, they are planted on vegetable beds for the shade they give. Propagation from seed, which is easy to grow. Indonesia, Philippines.

*A cult.* *Lactuca sativa* L. (Compositae); Lettuce; Laitue (Fr.); Lechuga (Sp.).  
Important annual herb, which forms a head. The flowers are yellow. The leaves are mostly eaten raw. To be sown broadcast on beds for leaf lettuce (3-4 kg per ha) or to be planted out 25 cm asunder for the heads. When transplanting is practised, 10 g seed is required per are. Seed growing is possible. Heads may be formed at low altitudes, but it is easier at greater



11. *Leucaena glauca* Benth.

elevations. In times of drought heavy watering is necessary; the plant does not resist pelting rain. Suitable headed varieties: Attractie, Meikoningin (soft-leaved), Mignonette, Iceberg (hard-leaved). Some varieties are grown for the loose leaves e.g. Cos lettuce. Protein content 0.6–2.1%. There are also wild forms e.g. *L. taracifolia* Sch. et Thon. (also cultivated) from Nigeria, *L. tuberosa* (Near-East) with 1.4% protein and *L. capensis* Thunb.

*AC cult.* *Lagenaria leucantha* Rusby (Cucurbitaceae) = *L. siceraria* Standley; Bottle gourd; Calebassier, Courge bouteille (Fr.); Cojombro, Guiro amargo (Sp.). Important annual, robust climbers with tendrils, white flowers and bottle-shaped fruits. The young tops and leaves and the young fruits are eaten, whereas the ripe fruit flesh is sometimes prepared. Protein content of the fruit about 0.2–0.7%, of the leaves 2.3–3.3%. Mostly raised as climbers spaced at 2 m or at 1.20–2.40 m (India). Suitable for the *compounds*. Sown at the beginning or at the end of the rainy season. After 2 months harvesting begins and it continues for 3 or 4 months. Seed required per ha:  $\frac{1}{2}$  to 2 kg.

*A cult.* *Lannea grandis* Engl. (Anacardiaceae) = *L. coromandelina* Merr. Very drought resistant tree, the young tops and leaves of which can be eaten. Can grow on very heavy soils. Suitable for *compounds*, also for border planting. A congener is:

*A* *Lannea acida* A. Rich.

Tree of which the young leaves are eaten (Guinea Coast) just like those of *L. oleosa* A. Chev. (Dahomey).

*abd cult.* *Lathyrus sativus* L. (Leguminosae); Chickling vetch, Grasspea; Gesse blanche (Fr.); Almorta (Sp.).

A subtropical plant, grown mostly for the seeds; protein content of the leaves 6%, of the seeds 27%.

*A cult.* *Lepidium sativum* L. (Cruciferae); Garden cress; Cresson alénois (Fr.); Lepidio (Sp.).

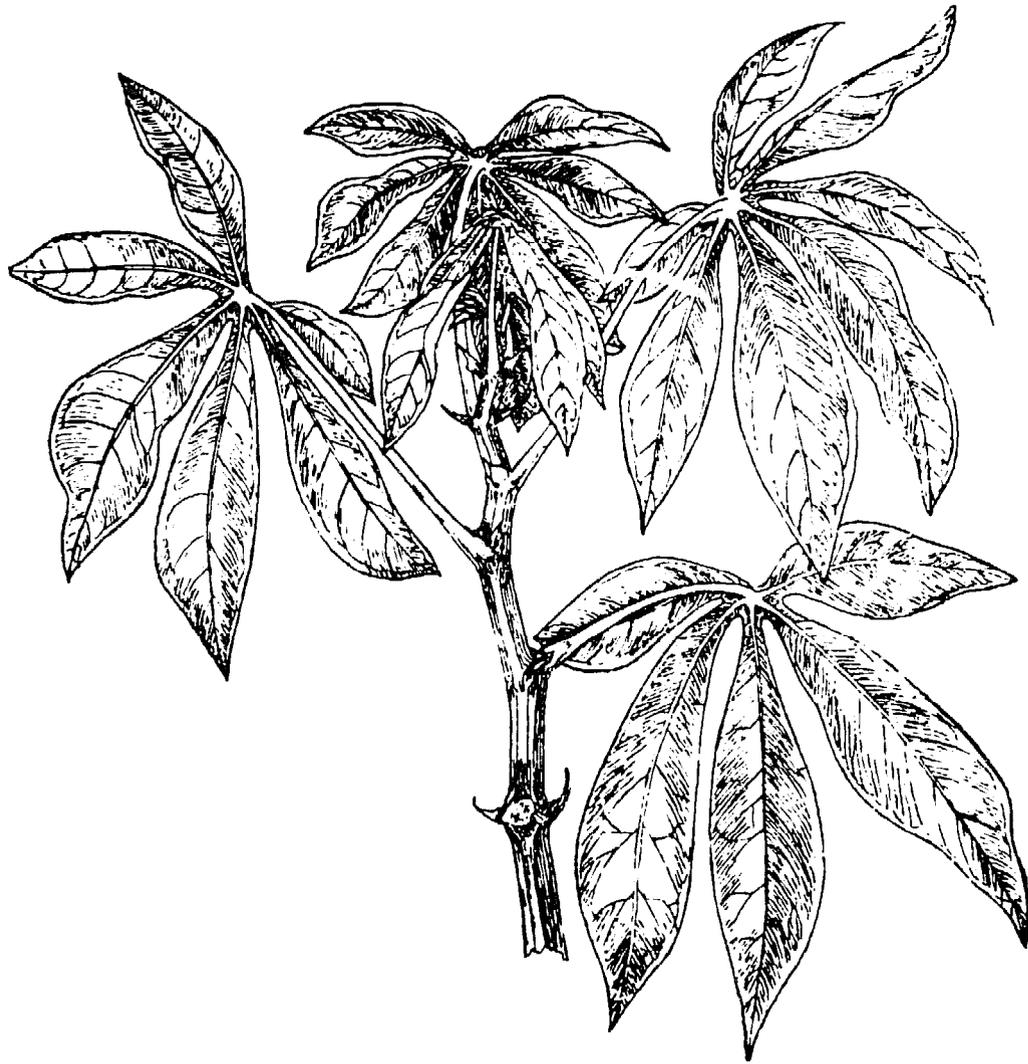
Small-leaved herb, the leaves (4–6%) of which are eaten raw as a salad. Needs relatively little water. For small surfaces. A congener, *L. meyenii*, is grown for its tubers in the Peruvian highlands. Also eaten are the leaves of *L. africanum* DC (= *L. capense*), *L. draba* L. (India), *L. myriocarpum* Lond. and *L. chilense* Kunze.

*ABC cult.* *Leucaena glauca* Benth. (Leguminosae); Horse tamarind, Lead tree.

Drought resistant tree, of which the young tops and flower buds, the white flowers, the leaves and the pods are eaten cooked. The half-ripe seeds are also eaten cooked. The ripe seeds are sometimes used for making taogé (bean sprouts) or they are roasted and pounded before consumption. Probably the ingestion of raw material causes the hair to fall out, at least in the case of non-ruminants. Suitable for the *compounds*. Protein content of the leaves 6–10%, of the young pods 4% and of the flowers 4–7.3%. The young pods of *L. esculenta* (Mexico) are eaten too. In India *L. cephalotes* Spreng., *L. clarkii* Hook. f., *L. lanata* Benth., *L. martinicensis* R.Br., *L. mollissima* Wall. and *L. zeylanica* R.Br. are used as potherbs.

*A cult.* *Limnocharis flava* Buch. (Butomaceae).

- Aquatic herb, grown in Java; the young leaves (1-1.6%), petioles and flower buds are eaten in Java and Malaya. Also known is *L. loangensis*, an aquatic plant from Africa.
- Lippia adoensis* Hochst. (Verbenaceae). A cult.  
Herb, cultivated as a potherb in Congo. Eaten is also *L. nudiflora* Michx. (Ceylon).
- Lotus edulis* L. (Leguminosae) = *L. tetragonolobus* L.; Asparagus pea, Winged pea; Lotier rouge (Fr.); Loto cultivado (Sp.). b cult.  
Annual of which the young pods are eaten.
- Luffa acutangula* Roxb. = *L. aegyptiaca* Mill. and *L. cylindrica* M. Roem. (Cucurbitaceae); Angled gourd, Ridged gourd, Loofah, Sponge gourd; Cource torchon (Fr.). AC cult.  
Important annual climber with tendrils; when rubbed, it smells bad; the flowers are yellow and the oblong fruits ribbed or smooth. The often bitter young leaves and fruits are eaten. Protein content of the fruits 0.5-3.4%, of the young leaves 1%. Grown creeping or climbing, preferably in the dry season; when creeping, it is spaced at 60 cm both ways; when climbing, with irrigation on beds at 1.20 by 2.40 m (India). After 10 weeks harvesting may begin and it continues for the whole of the dry period. Seed required per ha: 5 kg.
- Lupinus albus* L. (Leguminosae); Lupin; Lupin (Fr.); Altramuz, Lupino (Sp.). B cult.  
Annual herb of which the ripe seeds, which are very bitter, are eaten (after extraction with water), generally raw and with some salt. Unsuitable for the tropics, but it may still grow in the warm subtropics. Protein content of the ripe seeds 40%. The related *L. termis* Forsk. is bitter and slightly poisonous and is only eaten after having been soaked in water for a long time. In the Andes *L. mutabilis* Sweet is grown for the seeds (17%).
- Lycium chinense* Mill. (Solanaceae). a cult.  
Thorny shrub from China, grown for the leaves (3.3-4.3%). In Java, here and there in the mountains.
- Lycopersicon esculentum* Mill., see: *Solanum lycopersicum* L. A cult.
- Malva parviflora* L. (Malvaceae). a  
Annual, eaten as a potherb (4.4%), just like *M. sylvestris* L., *M. verticillata* L., *M. rotundifolia* L. and *M. niacensis* All., all of them from India and the Near-East.  
In Africa *M. capitata* Don is eaten.
- Mangifera indica* L. (Anacardiaceae); Mango; Mangue (Fr.); Mango (Sp.). A cult.  
Pantropical fruit tree, of which the young leaves and shoots may be eaten (3-4%) and the young fruits (0.7-1%), just like the leaves and shoots of *M. caesia* Jacq. (4%). Suitable for the compounds.
- Manihot utilissima* Pohl (Euphorbiaceae) = *M. esculenta* Crantz.; Cassava, Manioc, Tapioca; Manioc (Fr.); Yuca (Sp.). AD cult.  
Important shrub, containing a milky juice, with insignificant flowers; in the tropics, however, it rarely blossoms. Usually, it is grown for the root



12. *Manihot utilissima* Pohl.

tubers, which serve either as a staple food or as a supplement in soups and soups; however, the young tops and leaves are also eaten. The plant contains cyanide (the sweet tubers less than the bitter ones); therefore, the leaves cannot be eaten raw; the sweet ones have to be boiled for 5 minutes, the bitter ones, as a precaution, longer, perhaps for 15 minutes. Propagated by cuttings. Protein content of the old leaves about 4%, of the young leaves 6-10% (rather rich in methionine), of the tubers about 0.8-1%. Suitable for the compounds and fences.

On the compounds short cuttings with two eyes are put horizontally into the ground, spaced at 30 cm, so that a close planting is obtained, which can be harvested regularly. One should not start too early, nor pluck the young plants too intensively. The yield may amount to as much as 20,000 kg per ha a year, or even more. For leaf production, virus resistant varieties should be chosen (mosaic disease), because topping the plant spreads the virus rapidly over the whole planting.

When harvesting the tubers, the leaves may be plucked at the same time. These older leaves contain about 4% protein, but have to be boiled for a long time, if they are to become soft. Sometimes they are dried and ground; in the dry period, the powder is used in soups and sauces.

*Maranta arundinacea* L. (Marantaceae); Bermuda arrowroot; Arrowroot de la Barbado (Fr.); Sagu (Sp.) D cult.

Perennial herb with big leaves and small, white flowers; the subterranean, fleshy, thickened rhizomes are cooked in soups and sauces or used for making flour. Protein content of the tubers can be very low: 0.1-1.7%.

*Medicago sativa* L. (Leguminosae); Alfalfa, Lucerne; Lucerne (Fr.); Alfalfa (Sp.) a cult.

Perennial, subtropical herb, well-known fodder crop, of which the young leaves and shoots (6%, rather rich in methionine) are eaten (India), just like those of the wild *M. denticulata* Willd. (= *M. hispida* Gaertn.).

*Melia excelsa* Jack. (Meliaceae) A cult.

Tree grown in Malaya for the leaves and shoots (6.2%). The leaves of *M. indica* Brand. are also eaten.

*Mentha javanica* Bl. (Labiatae); Mint; Menthe (Fr.); Menta (Sp.) A cult.

Aromatic herb, of which the leaves are eaten, just like those of *M. merdina* Backer (Indonesia), *M. piperita* L., *M. spicata* L. (4.8%) and *M. umbellata* Hall. f. from India and the Sudan. Also known is *M. viridis* L. (2.7-4%). All are suitable for the compound. *M. arvensis* L. (2.6%) is not tropical.

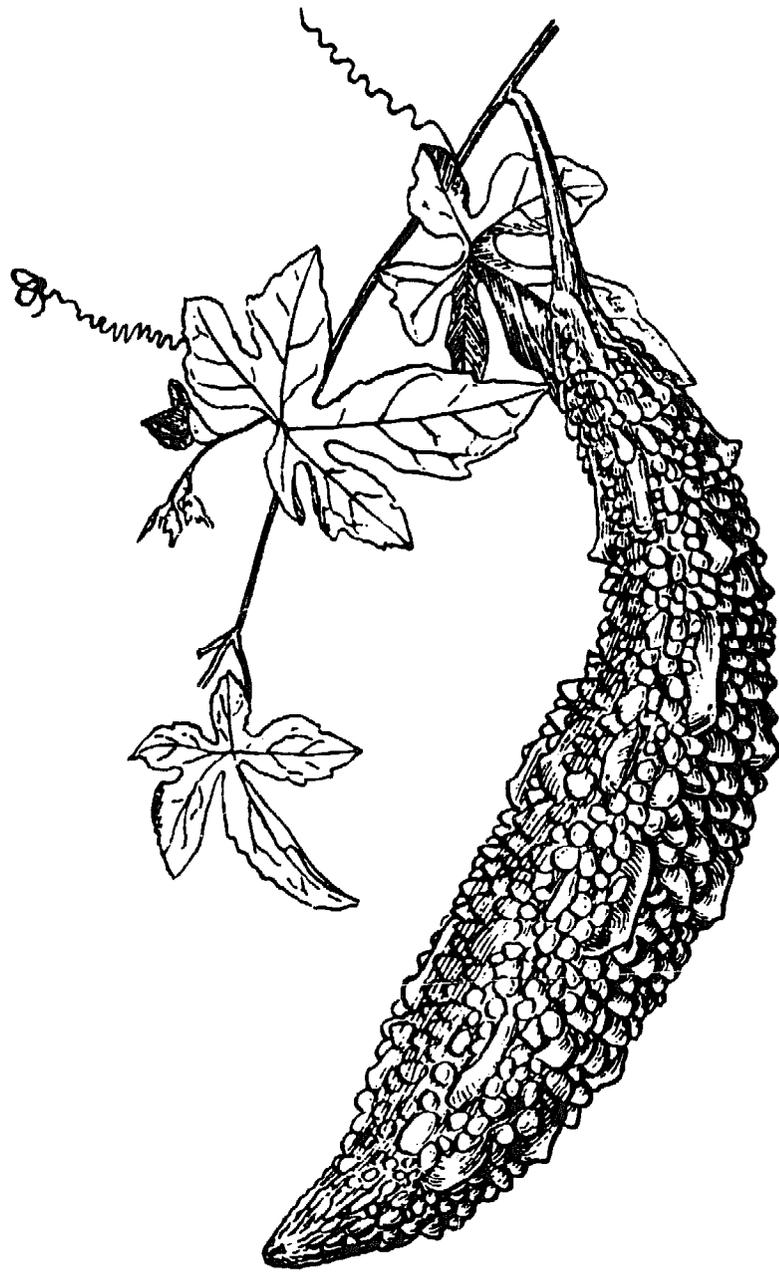
*Mesembryanthemum angulatum* Thunb. (Aizoaceae); Marygold. A cult.

Annual from South-Africa, grown as spinach in the Congo, propagated from seeds. Known also in India just like *M. crystallinum* L. (0.7%). *M. cordifolium* L.f. is used in South-Africa.

*Metroxylon sagu* Rottb. (Palmae) C cult.

The sago palm of which also the palm cabbage can be eaten.

*Momordica charantia* L. (Cucurbitaceae) = *M. muricata* Willd.; Bitter cucumber; Margose (Fr.); Cundiamor (Sp.) AC cult.



13. *Momordica charantia* L.

Important annual climber with tendrils and deeply lobed leaves; when rubbed, it smells bad; the flowers are small and yellow; the warty, ribbed, oblong fruits burst open, when they are ripe; they are bloodred inside. It is grown for the bitter young tops, leaves and fruits. They are planted against stakes, spaced at 50 cm both ways, or at 30 by 60 cm, or against fences etc. on the compounds. Seed required per ha: 2 kg. Protein content of the leaves 4.5-6%, of the fruits 0.8-2.1%.

*M. cochinchinensis* Spreng., *M. dioica* Roxb., *M. cissoides* Pl. and *M. foetida* Sch. et Th. are used in the same manner, just like *M. balsamina* L. (young fruits, in India), *M. subangulata* Bl. (Indonesia) and *M. tuberosa* Cogn.; or for the young, tender fruits only (with 0.6-1.3% for *M. cochinchinensis* and 3.1% for *M. dioica*). The fruits of *M. tuberosa* are also eaten. AC cult.

*Morinda citrifolia* L. (Rubiaceae); Mora de la India (Sp.). AC cult.  
Low, arborescent shrub with small, white flowers in spherical capitula, which can easily stand a drought of several months; the young fruits, but especially the young leaves are eaten. The ripe fruits are very bad-smelling and unpalatable. Protein content of the leaves 2.6-3.9%. *M. elliptica* Ridl. is also eaten.

*Moringa oleifera* Lam. (Moringaceae); Drumstick tree, Horseradish tree; Ben ailè, Néverdiè, Pois quénique (Fr.); Paraiso frances (Sp.). AC cult.

Important, low growing, tenuous tree with small, yellowish white flowers in panicles and fernlike divided leaves. The young tops and leaves, the very young, long, pulse-shaped fruits and the young seeds are eaten. The tree resists a drought of several months, but it needs well-drained soils. It is also used for shading vegetable beds. In India, a variety is reported with very tender fruits (Jaffna region). In India it is grown in hedges and regularly pruned for the young leaves. Suitable for the compounds.

Propagation preferably by planting out cuttings of 1-1.5 m spaced at 4 m both ways, or more densely in hedges. Some forms blossom richly; these are grown for the fruits; others yield more leaves. Protein content of the leaves 5-10% (rather rich in methionine), of the young fruits 0.9-9.1%, of the young seeds 3.6%.

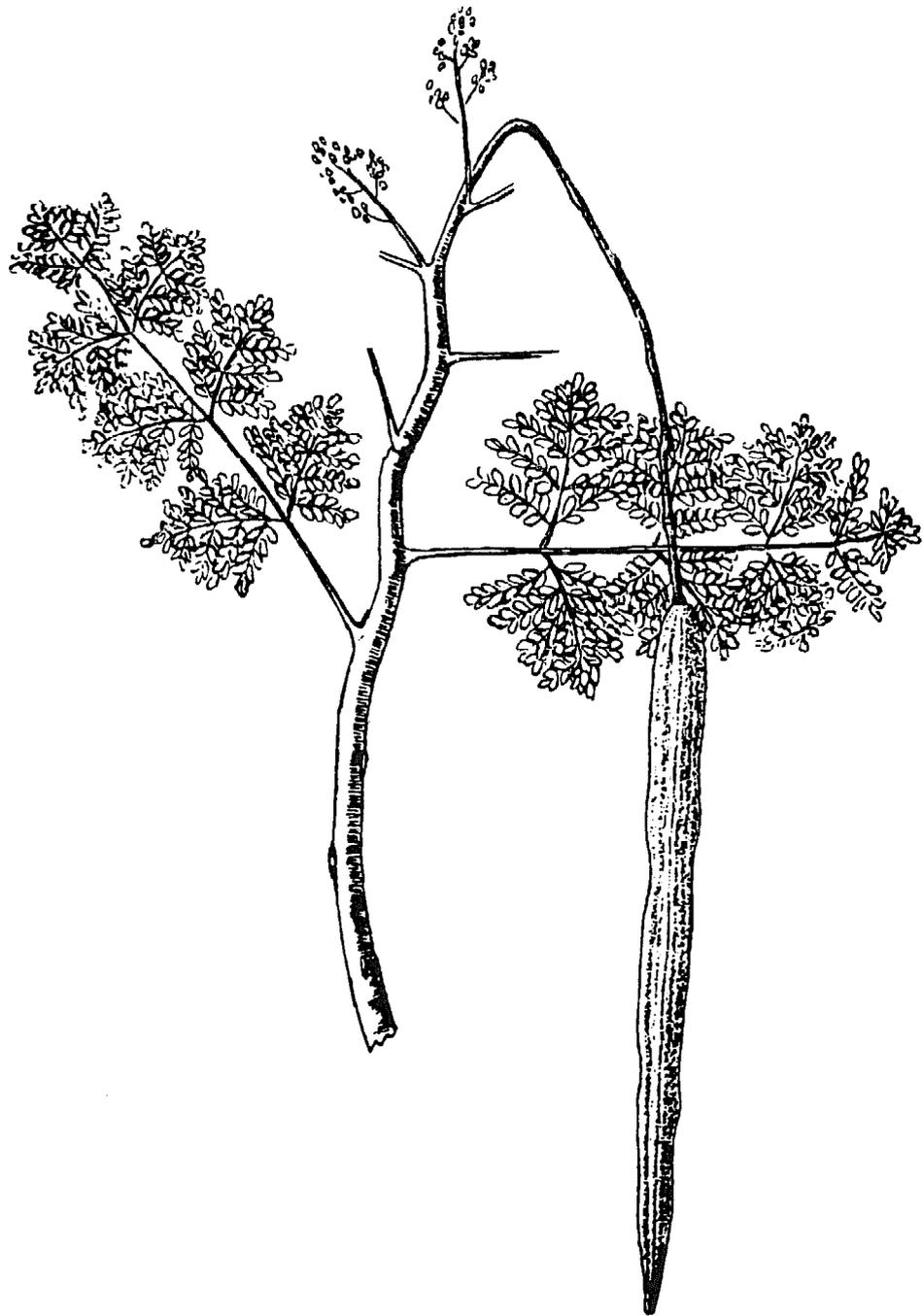
*Morus alba* L. (Moraceae); Mulberry; Mûrier (Fr.); Moral (Sp.). A cult.

Small tree, of which the young leaves and tops are eaten; the ripe, black fruits are used as fruit. Propagated by cuttings. Suitable for the compounds. Better suited to the higher belts than to the tropical lowlands. In Africa other *Morus* species are mentioned of which the leaves are eaten.

*Mucuna utilis* Wall ex Wight (Leguminosae) = *Stizolobium utile* Pip. et Fr.; AB cult.  
Velvet bean, Mauritius bean; Pois mascate (Fr.).

Drought resistant genus of beans; the young leaves, the young and ripe seeds (24%) and also the young pods are edible. Care should be taken, because there are poisonous forms and forms with itchy hairs. Especially the wild species *M. pruriens* is notorious.

Nowadays *Stizolobium* is distinguished: annuals with a hilum of  $\frac{1}{4}$ - $\frac{1}{2}$  of the seed's circumference, while *Mucuna* is perennial and has a longer hilum.



14. *Moringa oleifera* Lam.

*Murraya koenigii* Spreng. (Rutaceae); Curry leaf. A cult.

Tree of which the leaves (6.1%) are used as a seasoning (India) in curries. Suitable for the compound.

*Musa acuminata* Colla and *M. balbisiana* Colla (Musaceae); Banana, Plantain; Bananier, Plantain (Fr.); Camburo, Platano (Sp.). C cult.

Very important plants for the fertile soils of the warm, humid tropics. Both these ancestral species of the very important, edible *Musae* and their hybrids are high growing, herbaceous plants with a spurious stem.

One group (*M. acuminata*) yields mostly bananas which are eaten when ripe. As long as these fruits are unripe, they are astringent and sour, even after cooking. Raw or fried, they serve as a supplement in the diet. The second group (*M. balbisiana*) yields mostly plantains, which are grilled or cooked as the main food when unripe (they are then not sour).

The protein content of the fruits is 1-2%. The young tops of inflorescences are also eaten (0.5-1.9%). This is also true for *M. ensete* Gmel. (= *Ensete edule* Cheesman) in Ethiopia. The spurious stem serves as fodder for pigs. The rhizome contains 0.4% of protein. From the leaf sheaths and stalks of *M. ensete* a paste is made, which is then baked as a kind of bread. Suitable for the compounds. Propagation by offshoots or part of the root tuber. Other parts, that are eaten: the young fruits and spadix of *M. brachycarpe* Backer; the spadix of *M. glauca* Roxb., *M. salaccensis* Zoll. and *M. zebrina* van Houtte; the young lateral shoots of *M. zebrina*. Generally speaking, the *M. acuminata* types need more water and better drainage than *M. balbisiana* forms.

*Nasturtium officinale* L. (Cruciferae) = *Rorippa nasturtium* Rusby; Watercress; Cresson de fontaine (Fr.); Berro (Sp.). A cult.

Small-leaved herb, the leaves (1-2.8%) of which are eaten raw as a salad. Propagated from seed or cuttings. Suitable vegetable for the dry period, but it needs much water. To be grown on small surfaces, next to wells etc. Protein content 1-2.9%.

*N. heterophyllum* Bl. = *N. indicum* DC (= *Rorippa indica* Hiem.) of South-East-Asia. A

A leafy weed, which is very popular in Java (about 5%). Other species are: *N. barbariaefolium* Baker and *N. fluviatile* = *R. fluviatilis* R. A. Dyer from Africa.

*Nelumbium nelumbo* Druce = *N. nuciferum* Gaertn. = *N. speciosum* Willd. = *N. indica* Pers. (Nymphaeaceae); Lotus; Lotier (Fr.). AC cult.

Perennial, aquatic plant, of which, beside the raw or cooked fruits, also the young rhizomes (1.7-3.4%), the young stalks and the young leaves and flowerbuds are eaten, just like the young and ripe seeds (2.6-17%).

*Nothopanax* species (Araliaceae) such as *N. scutellarium* Merr., *N. fruticosum* Miq., A cult.

*N. pinnatum* Miq., also known as *Polyscias* e.g. *P. fruticosa* Harms.

Shrubs, of which the young tops and leaves are eaten; those of the first-mentioned species as a vegetable, those of the others mostly as a seasoning. Propagation by cuttings. Often used on compounds for hedges and fences,

- just like their congeners: *Schefflera* and *Trevesia* species. Protein content of *N. fruticosum* 2.6–2.8%, of *N. scutellarium* 3.3%.
- ACD cult.** *Nymphaea lotus* L. (Nymphaeaceae); Waterlily.  
Aquatic plant of which the rhizomes (3.4%), the flowers and receptacles (1.6%), the fruit, the young seeds and the mature seeds (8.3%) are eaten. The seeds are rich in methionine, other parts are rather rich in it. Also eaten is *N. elegans* Hook (rhizomes 7.9%).
- A cult.** *Ocimum basilicum* L. (Labiatae); Sweet basil; Basilic commun (Fr.).  
Annual seasoning herb, of which the leaves are eaten raw and boiled (3.3–3.8%). Related and also eaten are: *O. canum* Sims., *O. sanctum* L. and the perennial *O. arborescens* Bl. from Congo, and further *O. americanum* L. and *O. viride* Willd. All of them are suitable for the *compounds* when grown for the leaves.
- A cult.** *Oenanthe javanica* Aug. DC (Umbelliferae) = *O. stolonifera* Wall.  
Hollow-stemmed, perennial, aquatic plant with a carrot-like smell, eaten in Java and Malaya as a vegetable, raw or boiled (1.1–2.4%). Propagated by division and cuttings. Related is *O. laciniata* Joll. from Hawai, eaten and cultivated in the same manner.
- ad cult.** *Oxalis tuberosa* Molina (Oxalidaceae) = *O. crenata* Jack.; Oka (Andes).  
Small plant of the higher mountain belts (Andes), with small tubers (1.1–1.9%), which are eaten. The leaves too are consumed (1%), like those of *O. corniculata* L., *O. cernua*, *O. corymbosa* A. DC (*O. esculenta*?), *O. deppei* Ledd., *O. repens* Thunb., *O. tetraphylla* Cav.
- D cult.** *Pachyrrhizus erosus* Urb. (Leguminosae) = *P. bulbosus* Kurz, *P. angulatus* Rich. ex A. DC; Yam bean, Potato bean; Dolique bulbeux (Fr.); Jicama de agua (Sp.).  
The tubers of this climber (with poisonous seeds) are usually eaten raw, in Java often in “rudjak” i.e. a pungent, sweet sauce, containing a.o. brown sugar and chillies. Protein content 0.6–1.6%. According to some, the young pods are also eaten (Indo-China). Sometimes *P. tuberosus* Spreng. is mentioned separately (called Jicama); the young pods (2.6%) and seeds are said to be eaten too. Probably it is only a different variety. Known is also *P. ahipa* Parodi, a root tuber from the lower Andes.
- AB cult.** *Pangium edule* Reinw. ex Bl. (Flacourtiaceae).  
Tree with large leaves; the old leaves are eaten cooked; they contain much cyanide, but, it is said, less than the young ones. The seeds too are eaten, but rinsed and fermented. Occurs also on the *compounds*.
- B cult.** *Parkia speciosa* Hort. ex Hassk. (Leguminosae).  
Tree of South-East-Asia; the (young) seeds are eaten (25% for the old seeds) and the young leaves too. Moreover, the seeds of *P. intermedia* Hassk. and *P. javanica* Merr. The African *Parkiae*: *P. africana* R.Br. (= *P. clappertoniana* Keay), *P. biglobosa* Benth., *P. filicoidea* Welw. and *P. bicolor* A. Chev. yield seeds and fruit pulp for consumption, but *P. africana* only seeds; these are fer-

mented. The young leaves of *P. clappertoniana* (= *P. olivieri*) seem to be eaten too.

*Pastinaca sativa* L. (Umbelliferae).

*d cult.*

Herb with thickened root (1-1.5%), suitable only for the high mountain belts.

*Pennisetum purpureum* Schum. et Thonn. (Gramineae); Elephant grass; Herbe éléphant (Fr.); Pasto elefante (Sp.).

*C cult.*

The young flower panicles still enclosed in the bracts are sometimes eaten. Protein content 3.6%. Also *P. benthamii* St. is eaten.

*Pentaclethra macrophylla* Benth. (Leguminosae).

*C*

African tree, of which the seeds are used. They are very rich in fats and protein.

*Pentaphragma begoniaefolium* Wall. (Campanulaceae).

*A cult.*

Fleshy herb, grown as a vegetable in Malaya (1.9%).

*Peperomia pellucida* H.B.K. (Piperaceae).

*A cult.*

Herb, of which the leaves are eaten as a potherb. Pantropical,

*Perilla frutescens* Britt. (Labiatae); Perilla.

*Aa cult.*

The leaves (4%) of this oilseed are sometimes eaten.

*Petroselinum vulgare* Hill (Umbelliferae); Parsley; Persil (Fr.).

*A cult.*

Plant resembling celery; the fragrant leaf (3.2-5.9%) is used as a seasoning. Usually it is rather densely transplanted in rows 15 cm asunder. The seed germinates very slowly. Seed required per ha: 3-4 kg. The form with curly leaves is called *P. crispum*.

*Phaeomeria atropurpurea* Schum. (Zingiberaceae).

*A*

High growing, perennial herb, of which the young shoots, the young inflorescences and the half-ripe fruits are eaten.

*Phaeomeria speciosa* Kds. (Zingiberaceae).

*A*

High growing, perennial herb, of which the young shoots, the inflorescences (1.4%) and the half-ripe fruits are eaten.

*Phaseolus angularis* W. B. Wight (Leguminosae); Adzuki bean; Haricot adzuki (Fr.); Frijol adzuki (Sp.).

*Bb cult.*

Erect herb with yellow flowers; the cylindrical smooth pods have seeds (beans) with a hilum with a protruding ridge on the long sides. The young pods and the ripe seeds are eaten. Probably better suited to the high belts than to the tropical lowlands, though it is grown there for the young pods. Sown in batches of 3 or 4 seeds, spaced at 25 cm. Seed required per ha: 25 kg. The protein content of the young pods is unknown, that of the ripe seeds is 25%.

*Phaseolus aureus* Roxb. = *Phaseolus radiatus* L. (Leguminosae); Golden gram, green gram; Ambérique (Fr.); Judia de mungo (Sp.).

*AB cult.*

Important, erect herb with yellow or yellowish green flowers and thin, cylindrical, almost glabrous pods; the seeds (beans) are small and often almost spherical and they have a flat hilum, covered with a white, rough layer; the ripe seeds but also the young leaves and the young pods are eaten. The ripe seeds, harvested after 5 to 8 weeks, are used as beans, in

soups and especially for making taogé (bean sprouts). Sowing should preferably be done by the end of the rainy season, in batches of 2 or 3, or even 5 to 7 seeds, spaced at 50–60 cm, or less at 20–30 cm. The young leaves contain 8% of protein, the ripe seeds about 24%, the taogé 2–6%.

*AB cult.* *Phaseolus calcaratus* Roxb. (Leguminosae); Rice bean; Haricot riz (Fr.); Frijol arroz (Sp.).

Important, twining, slightly hairy herb with yellow flowers and cylindrical, often curved pods; the seeds (beans) are rounded on both sides and in shape they resemble rice grains; they have a hilum with protruding ridges on the long sides; the young pods and the ripe seeds are eaten as well as the young foliage. The seeds may be used for making taogé (bean sprouts). The young seeds contain 2% protein, the ripe seeds 20–22%.

*AB cult.* *Phaseolus lunatus* L. (Leguminosae); Lima bean, Sieva bean; Haricot de Lima, Pois du Cap (Fr.); Judia de Lima, Judia de Sieva (Sp.).

Important, perennial climber with greenish violet flowers and flat, curved, sometimes beaked pods; the seeds are flat and radially veined (from the hilum) and have a small, almost round hilum (resembling that of *Phaseolus vulgaris*). They are grown for the young pods, the young and the ripe seeds. Sometimes, the young leaves too are eaten. The ripe seeds of those varieties which are not guaranteed to be free of poison (cyanide), have to be boiled several times, while the cooking water has to be renewed. White-seeded forms are usually non-toxic after cooking. Batches of two or three seeds are planted at 30–50 cm by 50–80 cm. For bushy forms 50 to 100 kg of seed is required per ha, for the climbing beans 25 to 60 kg. Harvesting may begin after 4 to 6 weeks. The plant is not exacting. As a climber, it is also suitable for the compounds. The leaf contains 3–7.5% protein, the young pods 2.5–3%, the ripe seeds 20%, the young seeds 6.5–10.5%. The seeds are sometimes used for making taogé (bean sprouts), which are eaten cooked. They are then non-toxic.

*b cult.* *Phaseolus multiflorus* L. = *Ph. coccineus* L. (Leguminosae); Scarlet runner; Haricot d'Espagne (Fr.); Judia escarlata (Sp.).

Always climbing herb with a somewhat thickened root, red or red-spotted flowers and rough, coarse pods containing very big seeds; however, these are difficult to distinguish from the previous species in other respects. This bean grows only in the higher belts. Protein content of the young beans 7.5%.

*AB cult.* *Phaseolus mungo* L. (Leguminosae); Mung bean, Black gram; Haricot velu (Fr.); Frijol mungo (Sp.).

Important plant, resembling *P. aureus*, but somewhat more hairy; the white hilum protrudes somewhat from the seed, but in the middle it is concave, so that it seems to have two protruding ridges.

*AB cult.* *Phaseolus vulgaris* L. (Leguminosae); French bean, Kidney bean; Haricot commun (Fr.); Judia, Frijol común (Sp.).

Important, annual, climbing or erect herb, flowers white to purple, pods smooth; the seeds (beans) have a small, elliptical hilum; like all *Phaseolus*

species, they have two small lumps on one side of the hilum, a small hole on the other. The young pods and ripe seeds are eaten, and sometimes the young leaves. Usually the European forms are suitable only for the higher elevations (above 600 m); they don't resist attacks by the bean seed fly (*Agromyza*), which tunnels into the stem. But other forms (Brasil) are successfully grown in the lowlands. The bushy forms are planted in batches of 3 or 4 seeds, spaced at 40 cm; the climbing ones at 75 cm against stakes etc. Seed required per ha: 60-120 kg; for climbing beans 25-60 kg. Protein content of the young pods 1-4%, of the ripe seeds 22%. Related is *Ph. multiflorus*. *Phoenix* species (Palmae).

*a cult.*

The young shoot or terminal bud (palm cabbage) of *Ph. dactylifera* L. is eaten; the same is true for *Ph. reclinata* Jacq.

*Phyllanthus emblica* L. (Euphorbiaceae).

*A cult.*

Of this minor fruit tree the acid fruits (0.3%), resembling gherkins, are eaten, as are the young acid leaves. For the same purpose the young fruits (0.5%) and the young leaves of *Ph. acidus* Skeels are used.

*Physalis peruviana* L. (Solanaceae); Cape gooseberry, Ground tomato, Husk tomato, Peruvian cherry.

*c cult.*

Herb, of which the leaves, the young and the ripe fruits (1.4%) are eaten. Of some others, e.g.:

*Physalis minima* L., *Ph. angulatus* L., the leaves are also eaten.

*A*

*Ph. pubescens* is mentioned for the fruits.

*Pisonia alba* Span. (Nyctaginaceae).

*A cult.*

The cultivated form of a wild tree: *P. sylvestris* Teysm. et Binnend., of which the leaves are eaten as a vegetable (India, Java). Protein content of the young leaf 3.6%, of the older 5.1%. Suitable for the *compounds*.

*Pisum sativum* L. incl. *P. arvense* L. (Leguminosae); Pea, Field pea; Pois, Pois gris (Fr.); Guisante, Arveja gris, Guisante gris (Sp.).

*ab cult.*

Herbaceous plant with white flowers; sometimes the young pods and the young leaves are eaten, but always the young and the ripe seeds. Usually the culture is not very successful at lower altitudes, though I have seen dwarf-forms at sea-level (Victoria, Cameroons). Perhaps the time of sowing (increasing daylength) is important. They are more suitable for elevations of more than 1000 metres, and even so usually only the red-white or red flowering forms (*P. arvense*) with brown seeds succeed.

Bushy forms are sown in clumps spaced at 20 by 45 cm, climbing ones against poles, spaced at 45 by 4 cm. Seed required per ha: 60-100 kg. Protein content of the young pods 2.6-3.1%, of the young peas 3.1-7.2%, of the ripe ones 2%.

*Pithecolobium lobatum* Benth. (Leguminosae) (= *Pithecellobium*).

*B cult.*

Tree with twisted pods; the young, chestnut-shaped seeds are eaten; though people like them, they may cause haematuria. The young leaves of *P. kunstleri* Prain are eaten (Sumatra).

*Plantago major* L. var. *asiatica* (Plantaginaceae).

*A cult.*

Perennial herb, grown as a vegetable (2.5%) in Southern China and eaten

- also in Indo-China and Java as well as Madagascar (*Plantago* or *Cornupis* L.).
- A cult.* *Pleomele angustifolia* N. E. Brown (Liliaceae).  
Arborescent shrub, of which the young, still furled leaves are eaten. The same is true for *P. elliptica* N. E. Brown.
- A cult.* *Pluchea indica* Less. (Compositae).  
Drought resistant shrub of which the young, bitter tops, flowers and leaves are eaten. Grows also on heavy soils. Often on *compounds* as a hedge. Protein content of the leaves 2.9%.
- c cult.* *Polakowskia tacaco* Pitt. (Cucurbitaceae); Tacaco.  
The pulp of the fruit is eaten as a vegetable in Costa-Rica.
- A cult.* *Polygonum odoratum* Lour. (Polygonaceae).  
Aromatic herb (4.6%), grown in South-Vietnam. Eaten are also, either as a salad, a potherb or condiment: *P. hydropiper* L. (3.9%), of which *P. odoratum* is considered a variety, *P. minus* Huds. (2.8%), *P. perfoliatum* L. (all of them from South-East-Asia), *P. plebeium* R.Br. (3.2%) from India, *P. senegalense* Meisn., *P. serrulatum* Lag. from Congo and *P. salicifolium* Brouss., *P. barbatum* L., *P. cuspidatum* Sieb. et Zucc., *P. glabrum* Willd. (= *P. serrulatum*), *P. orientale* L., *P. pubescens* Blume, *P. guineense* Sch. et Th. (= *P. subpeltatum*) and *P. tomentosum* from Africa and Madagascar.
- A cult.* *Polyscia fruticosa* Harms.  
See *Nothopanax fruticosum* Miq.
- A cult.* *Portulaca* species (Portulacaceae) such as *P. oleracea* L., *P. quadrifida* L., *P. pilosa* L., *P. tuberosa* Roxb., *P. afra* Jacq. (South-Africa); Purslane; Pourpier (Fr.); Verdolaga (Sp.).  
Creeping herb with fleshy leaves and yellow flowers; the young tops and leaves are eaten. Both yellow and green forms occur, the yellow one being preferred. From 5 to 10 g of the fine seed is required per square m. When it gets insufficient water, it begins to flower. Seed growing is easy. When running wild, it is suitable for the *compounds*. Protein content 2-2.5%.
- a cult.* *Proboscidea jussieu* Steud. (Martyniaceae) = *Martynia proboscidea* Glox.  
Herb, of which the young fruits are eaten as a vegetable in California. Mentioned is also *P. fragrans* Linal. Annual, sometimes with a large tuberous root; the young fruits are pickled in vinegar.
- C* *Prosopis africana* Taub. (Leguminosae).  
African tree, of which the seeds are fermented, like those of *Parkia*. Very rich in methionine.
- AB cult.* *Psophocarpus tetragonolobus* A.DC. (Leguminosae); Goa bean, Four-angled bean, Winged bean; Pois carré (Fr.); Calamismis, Sesquidillas (Sp.).  
Important perennial (but usually grown as an annual), climbing herb with light-blue, sometimes white flowers, a thickened root (sometimes eaten), tetragonally winged pods and big seeds, which have an oval, flat hilum with a somewhat protruding white or yellowish ridge along both sides. The young leaves and pods are eaten, and sometimes the ripe seeds. To be sown, several seeds together, at 1 m by 1.5 m at the beginning of the rainy season. Harvesting begins after 4 months and continues for at least



15. *Psophocarpus tetragonolobus* A. DC

one year. In Java it is often grown, like cow peas, on the small dikes between the rice fields. Also suitable for the *compounds*. Protein content of the young pods 2-4%, of the leaves 3-5%, of the ripe seeds 33-40%. Other known species: *P. palustris*, of which the young pods and the roots are eaten, and *P. longipedunculatus* Hassk.

*A cult.* *Pterococcus corniculatus* Pax. et Hoffm. (Euphorbiaceae) = *Plukenetia paniculata* Smith.

Climber from Malaya, which is woody at the base. It is propagated by cuttings, which must have leaves and are planted in a sandy soil in the shade, spaced at 30 by 75 cm, against poles. It is eaten like spinach and has a sweetish taste. Protein content 5.3%.

*ad cult.* *Pueraria thunbergiana* Benth. (Leguminosae) (= *P. lobata*); Kudzu. Subtropical green-manure and soil-cover plant, of which the young leaves and shoots can be eaten, and also the tubers (1.3-2.1%). Propagated by cuttings. Also on the *compounds*.

*A cult.* *Quisqualis indica* L. (Combretaceae). Ornamental climber, of which the young leaves and shoots can be eaten.

*AD cult.* *Raphanus sativus* L. var. *hortensis* Backer (Cruciferae) = var. *raphanistroides* = var. *pinnatifida* = var. *longipinnatus*; Chinese radish; Daikon, Radis japonais (Fr.); Rabano blanco (Sp.).

Important herb with deeply incised leaves and white or pale-lilac flowers; the thickened roots are long or oblong and white inside. The tubers, which are much bigger than radishes, are eaten. Moreover, the young leaves and young plants are eaten as spinach. Seed required per ha: 5-10 kg. To be sown in or just after the rainy season in rows 30 cm apart, after which it is thinned out to 5-8 cm. Seed growing is possible. After only three weeks harvesting may begin.

The ordinary radish (*R. sativus*), grown for the small tubers, has leaves incised up to the middle nerve and these, as also the young fruits, are often eaten in the Middle East, but in the tropics it is not so popular. Seed required per ha: 40 kg. The seedlings are often attacked by leaf fleas, just like cabbages. Protein content of the leaves 2-4%, of the roots 0.6-1.1%, of the young pods 2.1%.

*a cult.* *Rheum hybridum* L. = *Rh. rhabarbarum* L. × *Rh. raponticum* L. (Polygonaceae); Rhubarb; Rhubarbe (Fr.); Ruibarbo (Sp.). Big-leaved, perennial herb, of which the sour leaf stalks are eaten (0.6-0.7%). Only for the mountains.

*A cult.* *Ricinus communis* L. (Euphorbiaceae); Castor oil plant. Half-shrub, of which the young leaves and shoots and especially the young flowers are eaten, but never the poisonous young or old seeds. Also on the *compounds*.

*A cult.* *Rosa* species (Rosaceae); Rose; Rose (Fr.); Rosa (Sp.).

The leaves of various roses: *R. damascena* Mill.; *R. moschata* Mill. and *R. multiflora* Thunb. are eaten in Java.

*Rumex abyssinicus* Jacq. (Polygonaceae); Sorrel; Oseille pahouine, Oseille sango (Fr.); Acedera (Sp.) *A cult.*

A kind of sorrel, which is frequently found in Gabon and the Congo. The leaves are eaten. Suitable for the *compounds*. The European species *R. acetosa* L. and *R. patientia* L. are not so suitable for the tropical lowlands unlike *R. ambiguus* Gren. (2%), *R. ambiguus* L., *R. crispus* L. (1.5%), *R. dentatus* L. (3%), *R. nepalensis* Spreng., *R. sagittatus* Thunb. and *R. vesicarius* L. (1.6%), which may be grown there or in India and the Near-East, especially the first two.

*Saccharum edule* Hassk. (Gramineae). *C cult.*

Perennial grass, of which the young, thick-set inflorescence is eaten, when it is still covered by the sheath. Propagation by cuttings and division. Protein content of the inflorescence 4.6-6%.

*Saccharum spontaneum* L. is often used for the same purpose. The young shoots are also eaten. *C*

*Sagittaria sagittifolia* (Alismataceae); Arrowhead. *D cult.*

Aquatic plant, grown in China for the edible tubers (0.5%). Also eaten in the Philippines.

*Sakesia laurenti* Cogn. (Melastomataceae). *A cult.*

Cultivated for the leaves in the Congo.

*Salacca edulis* Reinw. (Palmae). *A cult.*

Stemless, pinnate, leaved palm of which, besides the ripe fruits, also the cabbage is eaten.

*Sauropus androgynus* Merr. (Euphorbiaceae). *A cult.*

Important, low growing shrub with small, red flowers. Propagation by cuttings planted on beds, spaced at 60 by 10 cm, or in hedges on the *compounds*, or on vegetable beds where shade is needed. It reacts very favourably to mulching. After 4 months harvesting may begin. The top parts, young leaves and fruits are eaten very frequently, the leaves sometimes raw. Protein content 5.9-9.7%.

*Schefflera aromatica* Harms (Araliaceae). *A cult.*

Shrubby tree, of which the young, spicy leaves are eaten in Java. Propagated by cuttings. Suitable for *compounds*.

*Scolymus hispanicus* L. (Compositae); Spanish oyster plant. *d cult.*

Herbaceous plant with a thickened root, which is eaten. Suitable only for the mountains.

*Scorzonera hispanica* L. (Compositae); Beach salsify; Scorsonère (Fr.); Salsifi nero, Escorsonera (Sp.) *d cult.*

Herb of which the thickened roots are eaten. Suitable only for mountainous regions. The young leaves of *S. alexandrina* are eaten.

*Sechium edule*. Sw. (Cucurbitaceae); Balsam pear, Chocho; Choyote (Fr.); Chayote (Sp.) *ACD cult.*

Important, perennial climber with tendrils, thickened root and yellowish-



16. *Sauropus androgynus* Merr.

greenish-white flowers; the pear-shaped fruits have some prickly warts when young, three grooves and one big seed. The young tops, leaves and fruits are eaten, sometimes also the young seeds and the thickened roots. Grown on the *compounds*, preferably on a trellis. The plant can stand shade very well and even seems to need it in the lowlands. The first fruits come after 3-4 months. Propagation from seed or cuttings spaced at 1 m. Protein content of the leaves 4%, of the young fruits 0.4-1%, of the root 2%.

*Sesamum orientale* (= *S. indicum* L.) (Pedaliaceae); Gimgelly, Sesame; Sésame (Fr.). *A cult.*

Important herbaceous plant yielding oil seeds; the young tops and leaves are eaten; this is also true of:

*S. alatum* Thonn., *S. radiatum* Schum. et Thonn. and *S. angustifolium* Engl., *S. angolense* Welw., *S. calycinum* Welw. *A*

*Sesbania* (*Agati*) *grandiflora* Pers. (Leguminosae); Fayotier, Sesbanie (Fr.); Galletto (Sp.). *AB cult.*

Small tree with large yellowish-white or red flowers; the young leaves, the young pods and the flowers are eaten. It requires rather much water. Propagation from seed. It often serves to shade vegetable beds. Suitable for the *compounds*. Protein content of the young leaves 3-9%, of the pods 4%, of the flowers 1-1.8%. Also eaten are the flowers, young pods and leaves of *S. aegyptiaca* Pers. = *S. sesban* Merr. (1%), a green manure, and of *S. tetraptera* Hochst and the leaves and flowers of *S. roxburghii* Merr. (India).

*Sicana odorifera* Naud. (Cucurbitaceae) (= *S. blumei*); Melocoton. *A cult.*

Perennial climber from Central America with big fruits resembling cucumber; they are eaten both ripe and unripe.

*Sida rhombifolia* L. (Malvaceae); Escobilla (Sp.). *A cult.*

Perennial, 1.5-2.5 m high, grown for the young leaves and shoots in Central and South America (7.4%). Planted at distances of 1.20 m. *Sida humilis* Welld. var. *moriflora* is also mentioned as a vegetable.

*Sinapsis alba* L. (Cruciferae); White mustard. *a cult.*

Herb from India, grown for the seeds; the leaves are also eaten.

*Solanum aethiopicum* L. (Solanaceae). *A cult.*

Important herb with large, glabrous leaves (5.1%, rather rich in methionine) and small, bitter fruits which are eaten cooked. Besides *S. melongena* var., *S. macrocarpon*, *S. nigrum* and *S. nodiflorum* (see there) other leaf producing *Solanum* species are: *S. bansoense* Damm., *S. dewevrei* Damm., *S. distichum* Thonn., *S. duplosinuatum* Klotzsch (= *S. dazyphyllum* Sch. et Th., cult.), *S. erythracanthum* Dun., *S. giorgi* de Wild., *S. incanum* L. (wild form of *S. melongena*), *S. lescrauwaerti* de Wild., *S. olivare* Baill. et Buis., *S. subsessilis* de Wild., *S. terminale* and *S. wilde-mannii* Damm., all of them from Africa, and *S. blumei* Nees, *S. indicum* L. and *S. xanthocarpum* from Indonesia and India. The young fruits of *S. duplosinuatum*, *S. indicum*, *S. xanthocarpum* and some others are also eaten.

*Solanum lycopersicum* L. = *Lycopersicon esculentum* Mill. (Solanaceae); Tomato; Tomate (Fr.); Tomate (Sp.). *C cult.*

Important, annual, bad smelling, erect herb with yellow flowers and round



17. *Sechium edule* Sw.

fruits, which are red when ripe. Normally, only the ripe or almost ripe fruits, but sometimes also the leaves are eaten. Plant for fertile and well-manured soils. The best growth and yield require much water, much sunshine and low nocturnal temperatures. Usually, it is sown, pricked out and then transplanted at 75 to 100 cm. In this manner 0.5 kg seed is required per ha. The seed germinates slowly: 1 to 3 weeks. Crop rotation is necessary. In order to promote early bearing, the plants are often topped and the axillary shoots are cut out. There are also forms which just do not grow higher than the fourth raceme. Suitable varieties: Indian river, Marglobe, Urbana, Ponderosa. Local, small-fruited varieties are common in the tropics. Good seed should be chosen. Chlorotic or curly plants and those with leaf-curl disease must be thrown out immediately. Protein content of the fruits: 1% when ripe, 2% when unripe.

*Solanum macrocarpon* L. (Solanaceae).

AC cult.

Perennial, glabrous, shrublike herb without prickles, rich in forms; the flowers vary from pinkish white to violet; the leaves (4.7%) and the young fruits (1.4%) are eaten, often raw. The variety planted is var. *calvum* Bitter. Important vegetable of the Guinea coast. Suitable for the *compounds*.

*Solanum melongena* L. (Solanaceae) = *S. esculentum* Dunal = *S. incanum* L. (Wild form); Egg plant; Aubergine, Bringelle (Fr.); Berenjera (Sp.).

C cult.

Important, annual, shrubby herb with or without prickles; the leaves are a downy greyish green and the flowers violet; the oblong, smooth fruits are eaten when half-ripe to almost ripe. To be sown and transplanted at 40-50 by 60-70 cm. Seed required per ha: 0.5-1 kg. The seed germinates slowly. Suitable for fertile, preferably rather light soils. The first fruits come after three months. Also suitable for the rainy season. Protein content of the fruit 1-1.4%.

Another form is var. *inerme* Dunal with large, smooth, glaringly green leaves and pale-violet flowers, without prickles; the leaves (4.7%) and young fruits (1.4-2.0%) are eaten. Suitable for the *compounds*.

*Solanum muricatum* Ait. (Solanaceae); Peruvian pepeno, Melon pear.

a cult.

Half-shrub of which the ripe, blueish-white, hollow fruits are eaten. They are seedless and the plant is propagated from cuttings (Peru). It appears to be regarded more as a fruit than as a vegetable, as it is mostly eaten raw as such.

*Solanum nigrum* L. (Solanaceae) (= *S. oleraceum* Dum.); Black nightshade, Wonderberry; Morelle noire (Fr.); Yerba mora (Sp.).

A(C) cult.

Important, very variable herb with white or blueish-violet flowers; the leaves are eaten and, in some regions e.g. Indonesia, Trinidad, also the unripe or ripe fruits, which are considered poisonous in Europe. Probably, there are in reality different varieties. Suitable for the *compounds*. Protein content of the leaves 4-6% (rich in methionine), of the young fruits 2%. It is sometimes considered to be the same as:

*Solanum nodiflorum* Jacq. (Solanaceae); Herbe à calalou (Fr.).

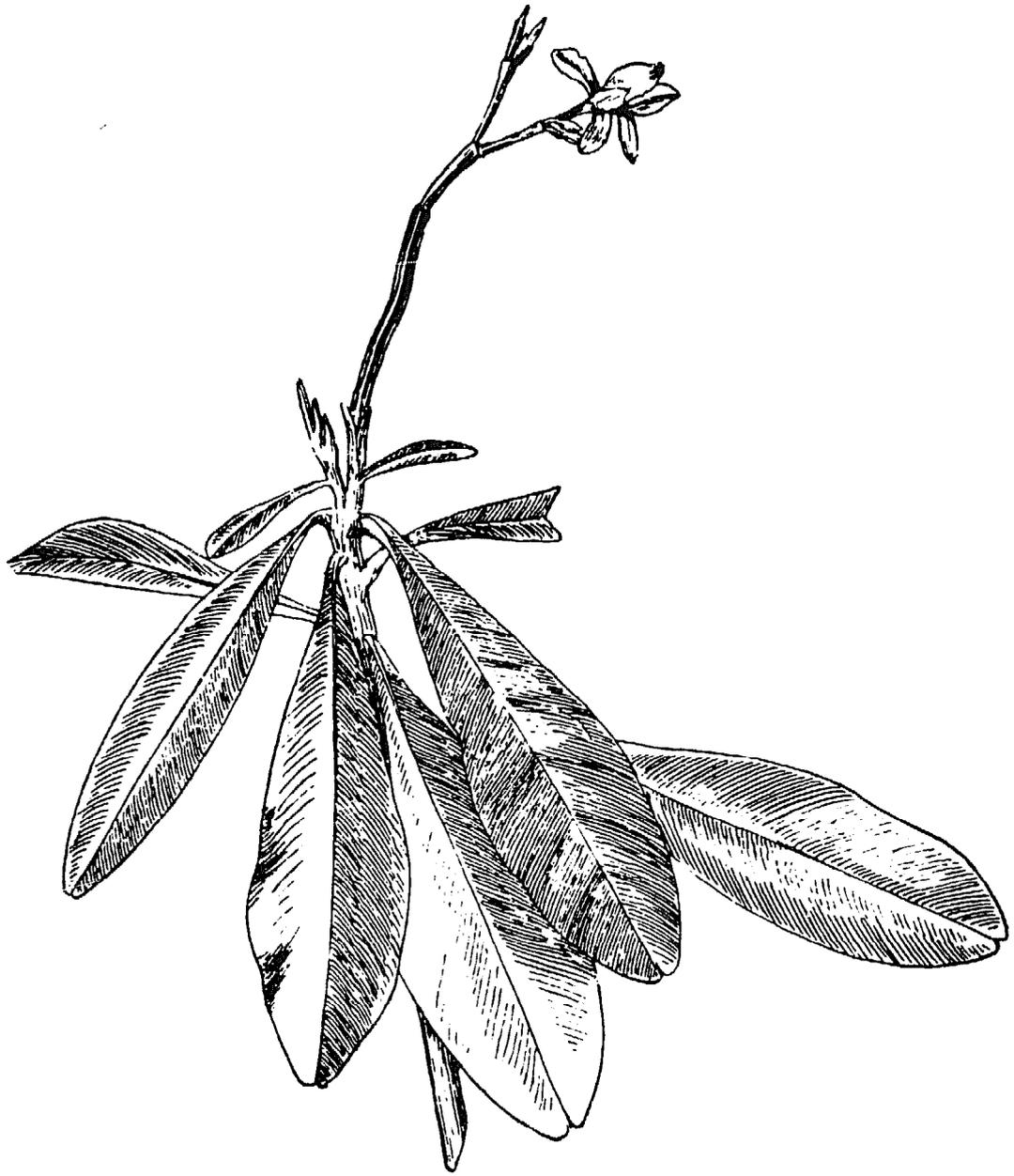
AC cult.

Herb with large leaves and white and violet flowers, grown for the leaves,

which are bitter, just like the fruits. Suitable for the *compounds*. Protein content of the leaves 1.5-4.8%.

- C cult.* *Solanum quitoense* Lam. (Solanaceae).  
Half-shrub of which the acid, yellow fruits are cooked as a sauce or com-  
pote. *S. piliferum* Benth. from Mexico is of the same type.
- C cult.* *Solanum torvum* Sw. (Solanaceae).  
Prickly shrub with grey, tomentose leaves and twigs, white or yellowish-  
white flowers and round fruits; only the young fruits are eaten. Cultiva-  
ted like the previous species, but spaced at 1.5-2 m. Also suitable for the  
*compounds*. Protein content of the fruits 2%. In the same manner the fruits  
of *S. anomalum* Thonn. (ripe red berries), *S. agrarium* Sendt., *S. diversifolium*  
Schlecht, *S. ferox* L. are used, and also those of *S. gilo* Raddi (South America)  
*S. involucreatum* Bl. and *S. prestum* Dunal, but raw, while the young fruits of  
*S. aculeatissimum* Jacq. are roasted on a skewer. The fruits of *S. pierreanum*  
Boiss., *S. indicum* L., *S. olivare* Baill. et Boiss. and *S. riparo* Dun. are also eaten.
- d cult.* *Solanum tuberosum* L. (Solanaceae); Irish potato; Pomme de terre (Fr.); Papa  
(Sp.).  
Important, tuber bearing plants with white to lilac flowers; only the  
tubers (2%) are eaten, usually as a staple food, but also as a supplement in  
soups and sauces, or fried. Suitable only for rather high altitudes. In Java  
and India the leaves too are eaten (4.4%).
- A cult.* *Solenostemon monostachyus* Briq. (Labiatae) (= *S. ocymoides* Sch. et Thonn.).  
Old-fashioned potherb in Africa; the leaves are eaten, but it is slowly going  
out of use.
- A cult.* *Sonchus* species (Compositae) such as: *S. arvensis* L., *S. asper* Hill, *S. bipontini*  
Arch., *S. oleraceus* L. (= *S. laevis* Vill.), *S. exauriculatus* O. Hoffm.  
Herbaceous weeds, containing a milky juice; the stems are hollow and the  
flowers a light yellow, sometimes tinged red at the base; the young tops  
and leaves are eaten (2.4%). Especially the wild forms are bitter, more  
particularly *S. arvensis*. They are often found wild and on the *compounds*.
- D cult.* *Sphenostylis congensis* (Leguminosae).  
Tuber forming herb from the Congo.
- BD* *Sphenostylis* species (Leguminosae) such as: *S. stenocarpa* Harms, *S. briarti* Bak.  
f., *S. erecta* Hutch., *S. schweinfurthii* Harms.  
Climbing beans, of which the subterranean stem tuber with 3.6% protein  
(*S. stenocarpa*) and the young pods and seeds are eaten. The leaves of *S. steno-*  
*carpa* and *S. erecta* are eaten too.
- A cult.* *Spilanthes* species (Compositae) such as: *S. acmella* Merr. (now split up into  
*S. jabadicensis* H. H. Moore and *S. paniculata* Wall.) *S. ocymifolia* A. H. Moore,  
*S. oleracea* Jacq. (syn. of *S. acmella* var. *oleracea*).  
Herbaceous weeds of which the young tops and leaves are eaten. *S. acmella*  
is sometimes cultivated (Para cress). Protein content of *S. ocymifolia* 2%.
- a cult.* *Spinacia oleracea* L. (Chenopodiaceae); Spinach; Epinarads (Fr.); Espinaca (Sp.).  
The real spinach, of which the tops and leaves (2-2.6%) are eaten. In the

- tropics, however, it thrives only at low temperatures, i.e. at high altitudes. Seed required per ha: 15-20 kg. Rather rich in methionine.
- Spondias cytherea* Sonn. (Anacardiaceae) = *S. dulcis* Forst.; Otaheite apple; AC cult.  
Pomme cythère (Fr.); Caja mange (Sp.).
- Of this fruit tree, the young leaves and shoots and the young fruits are eaten, just like those of *S. pinnata* Kurz. and *S. purpurea* L. (4.3%). Suitable for the compounds.
- Stachys tuberifera* Naudin (Labiatae). d cult.  
Herbaceous plants with stem tubers, from China, suitable only for the mountains.
- Strelitzia reginae* Banks (Musaceae). D  
Tuber (3%) from the Philippines.
- Strychnos spinosa* Lam. (Loganiaceae). A cult.  
An African fruit tree of which also the leaves are eaten.
- Tacca leontopetaloides* O.K. (Taccaceae) = *T. pinnatifida* Forster; Polynesian D  
arrowroot; Arrowroot de Tahiti (Fr.).
- Tuber bearing plant with incise leaves; the tubers (1.5%) are sometimes eaten in an emergency; however, the very bitter tubers are ready for consumption only after washing and extracting with water. Usually meal is made of them. It is related to the African *T. involucrata* Schum. et Thonn., which has pungent and bitter tubers, as big as a fist.
- Tagetes patula* L. (Compositae). A cult.  
Herb of which the leaves are used for seasoning in the Congo. It can be used for eliminating nematodes through field rotation.
- Talinum triangulare* Willd. (Portulacaceae); Ceylon spinach, Philippine spinach, Water leaf; Grassé (Fr.); Espinaca de Filipinas, Verdolaga francés (Sp.). A cult.  
Important, perennial herb with spatulate, fleshy leaves and pink or red flowers; the slightly sourish tops and leaves are eaten. Grows in all seasons and even rather satisfactorily on infertile soils. Propagated from seed (0.5 g per m<sup>2</sup>) but mostly by cuttings (top parts) of 15-20 cm, planted out at 20 cm both ways. Very suitable for the compounds. Protein content 1.3-5.8%. Other species of which the leaves are eaten: *T. arnottii* Hook.f., *T. cafferum* Eck. et Zeyh., *T. portulacifolium* Asch. et Schweinf. and *T. patens* Willd. from South-America.
- Tamarindus indica* L. (Leguminosae); Tamarind; Tamarinier (Fr.). C cult.  
Drought resistant tree with finely pinnate leaves, yellowish capitula and brown pods, the black seeds of which are surrounded by a brown pulp (3%). This pulp is used for souring dishes, for pastry etc. Sometimes the young leaves (3-4%) are eaten, as are the young pods (3.9%).
- Taraxacum officinale* Weber (Compositae); Dandelion; Pissenlit (Fr.). a cult.  
Perennial herb, of which the young, bitter leaves (2.4-2.7%), often bleached by covering with soil, are eaten.
- Telfairea occidentalis* Hook.f. (Cucurbitaceae); Fluted gourd. AB cult.



18. *Talinum triangulare* Willd.

Important climber with very big, ribbed, cucumber-like fruits with edible seeds; however, in contradistinction with *T. pedata* Hook, it is grown not so much for the seeds as for the top shoots and young leaves. Suitable for the compounds, against fences and buildings. Protein content of the young leaves unknown, of the seeds 30%.

*Tephrosia vogelii* Hook (Leguminosae).

A cult.

The young leaves and shoots of this green manure and of *T. purpurea* Pers. may be eaten. *T. elegans* Schum. is also used in Africa. The leaves of *T. linearis* Pers. and of *T. purpurea* are used as a flavouring.

*Tetracarpidium commiphorum* Hutch. et Dalz. (Euphorbiaceae).

A cult.

Fruit tree from the Congo and Sierra Leone, grown for the walnut-like fruits and for the young leaves and shoots.

*Tetragonia expansa* Miers (Aizoaceae); New Zealand spinach; Tétragone (Fr.); Espinaca extranjera de Nueva Zelandia (Sp.).

Aa cult.

Important, perennial, branched herb with insignificant, yellow flowers; the fleshy leaves and the tops are eaten as spinach. It often grows less well at sea-level than at higher altitudes. It is usually raised on beds, either from seed (15–20 kg per ha) or from cuttings. Protein content 1.5–4%.

*Thymus vulgaris* L. (Labiatae).

a cult.

Sometimes grown in the tropics as a condiment.

*Tragopogon porrifolius* L. (Compositae); Salsify.

d cult.

Herbaceous plant, the thickened root of which is eaten (1.4–3.3%). Only for the mountains. The young shoots and roots of *T. pratensis* L. are eaten in the Near-East.

*Trapa bicornis* Osbeek (Hydrocaryaceae).

B cult.

Aquatic plant of which the seeds are eaten, just like those of the wild *T. quadrispinosa* Roxb.

*Treculia africana* Dec. (Moraceae); African breadfruit; Arbre à pain (Fr.).

C cult.

Tree containing a milky juice, with big round fruits, which have conical prickles; the small seeds are eaten cooked, grilled or fried; meal is also made of them. Suitable for the compounds.

*Trevesia sundaica* Miq. (Araliaceae).

A cult.

Shrubby tree, of which the flower buds and the young shoots and leaves are eaten, always boiled, in Java. Propagated from cuttings. Suitable for the compounds.

*Trianthema* species (Aizoaceae) such as: *T. pentandra* L., *T. portulacastrum* L. (= *T. monogyna* L.).

A

Herbaceous weeds with thick leaves and small, sessile, white flowers in the leaf axils; the young tops and leaves are eaten. Protein content 2–3.3% (*T. portulacastrum*).

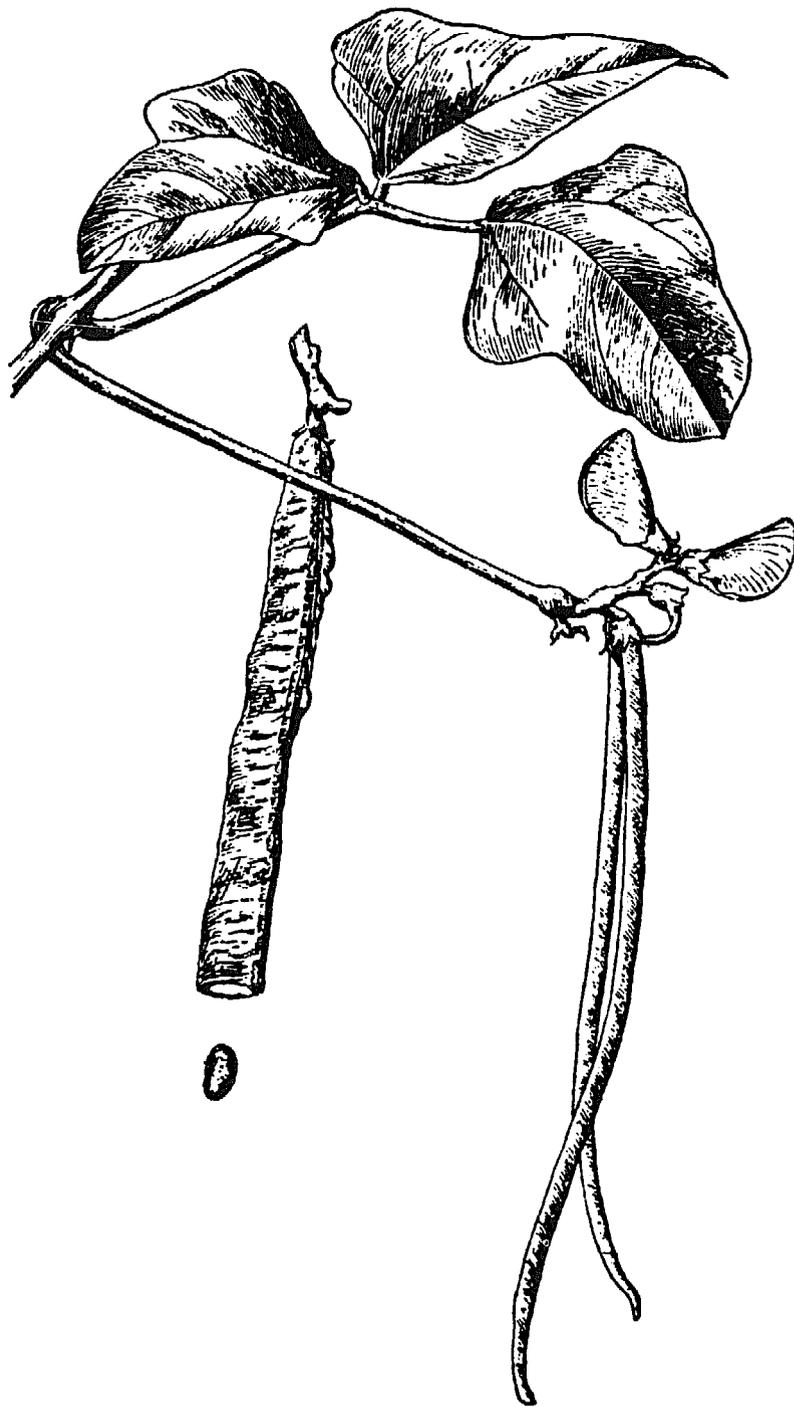
*Trichosanthes anquina* L. (Cucurbitaceae); Snake gourd; Courge-serpent, Serpent végétal (Fr.); Cohombre vibora (Sp.).

AC cult.

Important climber with tendrils; it smells bad and has small, white flowers; the very long fruits are eaten when young, as are also the young leaves and shoots. The plants are spaced at 1.5–2 m, or at 0.5 against fences etc. but

preferably they should be trained over a horizontal trellis (4 seeds per pole at 3 m). Seed required per ha: 2 kg. Also suitable for the *compounds*. Harvesting starts after 6 weeks and continues for 1 to 2 months. Protein content of the fruits 0.5–0.9%, of the leaf 5.4% and of the young fruits 2% (*T. dioica* Roxb.). *T. cucumerina* L., *T. ovigera* Bl. and *T. palmata* Roxb. are used in the same manner or, perhaps, they are even identical. Known are also: *T. diseca* (India) and *T. celebica* Cogn. (Indonesia).

- a cult.* *Trigonella foenum-graecum* L. (Leguminosae); Fenugreek; Fénugrec (Fr.). Herb of which the leaves are used as a vegetable (4.4–4.9%) in India, just like those of *T. corniculata* L. and *T. polycerata* L. and those of *T. occulta* Del. in Africa.
- d* *Tropaeolum tuberosum* R. et P. (Geraniaceae); Cubios (Sp.). Herb with small tubers (1.3–1.6%), which are sometimes eaten (High Andes). The leaves and flowers of *T. maius* L. are also used.
- A cult.* *Typhonium trilobatum* Schott. (Araceae); Yam. Tuber (1.4%) forming herb, eaten in India; in Ceylon its leaves are also used.
- d cult.* *Ullucus tuberosus* Cald. (Chenopodiaceae); Ulluco. Small plant from the High Andes; it has small tubers (1%), which are eaten, also the leaves are edible. Propagation from tubers and cuttings.
- A cult.* *Urena lobata* L. (Malvaceae). Half-shrub, of which the young leaves (3.1%) can be eaten. Suitable for the *compound*.
- a cult.* *Valerianella olitoria* Poll. (Valerianaceae); Corn salad; Mâche (Fr.). Herbaceous plant, the leaves of which are eaten, mostly fresh. Only for mountainous regions. Very rich in methionine.
- D* *Vallisneria gigantea* Graebn. (Hydrocharitaceae). Water plant from the Philippines, forming tubers (1.5%).
- A cult.* *Vernonia* species (Compositae) such as *V. cinera* Less., *V. appendiculata* Less., *V. biafrae* Oliv. et Hiern., *V. calvoana* Hook.f., *V. chinensis* Less., *V. colorata* Drake, *V. fastigiata* Oliv. et Hiern., *V. perrottetii* Sch. Bip., *V. senegalensis* L. Herbaceous weeds, of which the leaves (*V. cinera* 2.7%) are eaten half-raw, or cooked because of the slightly bitter taste. Related is a small, shrub-like tree from Africa;
- A cult.* *Vernonia amygdalina* Dal. (Compositae); Bitter leaf. The very bitter leaves of this small are very popular in Africa, mostly used in sauces.
- b cult.* *Vicia faba* L. (Leguminosae); Broad bean; Fève, Fève de marais (Fr.); Haba (Sp.). Herbaceous plant with white, black-spotted flowers and swollen pods; the leaves, the young and the ripe seeds are eaten. Only suitable for the elevated regions of the tropics. Spaced at 15 to 40 cm. Protein content of the ripe beans 23%, of the young beans 2.3–9.3%, of the leaves (sometimes eaten) 5.6%. Of *V. abyssinica* Steud. the young leaves are eaten in Malawi.



19. *Vigna unguiculata* Walp.

*AB cult.* *Vigna unguiculata* Walp. (Leguminosae) = *V. sinensis* Savi ex Hassk.; Cowpea; Dolique mongette, Haricot dolique, Dolique de Chine, Niébé, Pois de Brésil (Fr.); Frijol de ojo negro (Sp.).

Very important, annual herb with both climbing and bushy forms; the flowers are white, yellow or blue; the pods long and flaccid or stiff; the seeds (beans) have a somewhat triangular hilum, which is somewhat sunken at the broader end; the young leaves and pods and the ripe seeds are eaten. Some climbing forms are exclusively grown for the very young, long pods (Yardlong bean; Dolique asperge (Fr.); *Judia asparaga* (Sp.)). Also called *V. sesquipedalis* Fruw. In Java they are often grown on the small dikes between the rice fields; batches of 3 to 6 seeds are spaced at 60 cm. Known as asparagus bean. Most of the forms are sensitive in regard to day-length, some are not. Those with long, young pods are suitable for the compounds, where they grow against poles and hedges. The protein content of the leaves is 2-5.3%, of the young pods 2-4.3%, of the old pods up to 9%, of the young seeds 4.5-5%, of the ripe seeds 24% and of the taogé (bean sprouts) 5%. Seed required per ha: 25-50 kg. Also eaten are the leaves of *V. marina* Merr., *V. marginata* Benth., *V. phaseoloides* Baker, *V. reticulata* Hook.f. and *V. triloba* Walp. (Cult.).

*A* *Vitex* species (Verbenaceae) such as *V. cienkowski* Kotsch et Peyr. and *V. doniana* Sweet.

Trees of which the leaves are eaten. Both are rather rich in methionine.

*a cult.* *Vitis vinifera* L. (Vitaceae); Wine grape; Vigne (Fr.); Vid, Uva (Sp.).

Climbing shrub of which, especially in the Near-East, the young, slightly acid leaves are eaten (3%), mostly wrapped around other dishes. Related are *V. lanceolaria* Wall, of which the leaves are eaten and also the various *Cissus* species mentioned under IIIB.

*C cult.* *Voandzeia subterranea* Thouars (Leguminosae); Bambara groundnut; Vouandzou (Fr.).

The young pods of this pulse are sometimes eaten.

*AC cult.* *Xanthosoma violaceum* Schott (Araceae) (= *X. sagittifolium* Schott), *X. brasiliense* Engl., *X. mafaffa* Schott, *X. caraca*, *X. albertii*, *X. jacquini* Schott; Tania, Yautia; Chou caraibe, Tanier (Fr.); Yautia (Sp.).

The first-mentioned plant is important; it has a thick, milky juice and tubers with offshoots; the leaves are sagittate, green or blueish-violet and have a marginal vein; the inflorescences resemble arum; the thickened lateral tubers and the long stolons are eaten, but also the leaves and leaf stalks. It may be propagated by planting out the longest stolons, but usually the old plants are dug up, the old rhizomes are cut off, the leaves shortened and the remainder is planted again in well-loosened soil at 80-100 cm. Plant material required per ha: 10,000-15,000 tops. Protein content of the young leaves 2.2-4.1%, of the tuber 1.1-1.7%. The other *Xanthosoma* plants are narrowly related species or forms.

*Zea mays* L. var. *rugosa* (Gramineae); Sweet corn, Maize; Maïs (Fr.); Maíz (Sp.) *C cult.*

Annual cereal with female flowers in spikes, which in time become spadices (cobs); the young cobs or the young seeds are eaten as a vegetable, e.g. Golden Bantam. They are spaced at 40-50 by 80-100 cm, or in rows at 30 with 60-90 cm between the rows, in batches of 2. Seed required per ha: 10-15 kg. Protein content of the young seeds 4-4.7%, of the young spadix with the very young seeds 1.9-3.5%. This is a special variety of *Zea mays* used for this purpose, but the spadices and the seeds of the usual kinds of maize may also be eaten. Golden Bantam is very dependent on daylength. The tender young leaves are also eaten (Madagascar).

*Zingiber amaricans* Bl. (Zingiberaceae). *AD*

Perennial herb of which the rhizomes and inflorescences are eaten.

*Zingiber odoriferum* Bl. (Zingiberaceae). *A*

Perennial herb of which the flower buds and the heart of the spurious stem are eaten.

*Zingiber officinale* Rsc. (Zingiberaceae); Ginger; Gingembre (Fr.). *A cult.*

Perennial herb of which the young rhizomes (1.1-2.3%) and shoots are eaten, just like those of:

*Zingiber zerumbet* E.Sm. (Zingiberaceae); Zeodary.

*Zinnia elegans* Jacq. (Compositae). *A cult.*

Ornamental herb of which the leaves and young shoots may be eaten (0.8-2.1%).

*Zizania latifolia* Turcz. (= *Z. aquatica* L.) (Gramineae); Water bamboo, Wild rice. *C cult.*

Grass of which the fleshy young shoots (1.2-2.5%) are eaten (Tonkin, Annam, Singapore, China, Hongkong).

*Ziziphus mauritania* Lam. (Rhamnaceae). *A cult.*

The young leaves of this tree are eaten in couscous.

## ENUMERATION OF VEGETABLES (Continued)

On the following pages the reader will find the sub-chapters:

- B. OTHER PLANTS PRODUCING EDIBLE YOUNG LEAVES OR SHOOTS
- C. PALMS FOR PALM CABBAGES.
- D. FERNS AND RELATED PLANTS. (Many ferns are eaten, especially the young fronds, which are collected from plants growing wild. As far as we know, they do not provide vitamin B<sub>1</sub>.)

These lists have to be read as follows:

First comes the botanical name; next one or more of the following indications (when known):

!	poisonous	h	aquatic plant
a	tree	i	mangrove tree
b	shrub	j	marsh fern
c	climber	k	earth fern
d	herb	l	epiphytic fern
e	edulcorant	m	tree fern
f	flavouring	n	climbing fern
g	spice		

These indications are followed by abbreviations of geographical names:

A	Asia	Ce	Ceylon
Af	Africa	Ch	China
Am	America	EAF	East Africa
An	Angola	ENi	East Nigeria
B	Burma	Et	Ethiopia
Bo	Borneo	FE	Far East
C	Congo	Fi	Fiji Islands
Ca	California	Fo	Formosa (Taiwan)
CAf	Central Africa	Ga	Gabon
CAM	Central America	GC	Guinea Coast
Cb	Celebes	Gh	Ghana

Gu	Guiana	Ni	Nigeria
I	India	P	Pantropical
IC	Ivory Coast	Pa	Pacific Islands
ICh	Indo-China	Ph	Philippines
Io	Indonesia	Po	Polynesia
Ja	Japan	R	Rhodesia
L	Liberia	Ré	Réunion
Ly	Libya	SAf	South Africa
M	Malaya	SAm	South America
Me	Mexico	SEA	South East Asia
Mg	Madagascar	SL	Sierra Leone
Mo	Moluccas	Sm	Sumatra
Mw	Malawi	So	Somali
NAf	North Africa	Su	Sudan
NAm	North America	T	Thailand (Siam)
NE	Near East	WAF	West Africa
NG	New Guinea		

When known, the protein contents are given between brackets and miscellaneous information is contained in the following notes:

1) also young pods 2) flowers 3) heart 4) acid leaves 5) flowers only 6) leaf bases 7) inflorescences 8) rather rich in methionine 9) young fruits 10) only with kola 11) unripe fruits 12) highlands 13) flower buds 14) young tops 15) stolon, petioles 16) cabbage 17) young plants 18) sprouts 19) young shoots 20) terminal bud 21) shoots 22) stems 23) also young fruits 24) young pods 25) very bitter 26) also marrow 27) also juice 28) also young leaves 29) also plantlets 30) also pollen 31) also flowers.

## IIIb

- Abrus precatorius* L. (Leguminosae) a e P  
*Abutilon cabrae* de Wild. et Th. Dur. (Malvaceae) b C  
*Acacia arabica* Willd. (Leguminosae) b Af  
*Acacia concinna* DC (Leguminosae) b I Ph (6.7%)  
*Acacia insuavis* Lace (Leguminosae) c T  
*Acacia macrothyrsa* Harms (Leguminosae) b Mw  
*Acacia nilotica* Del. var. *tomentosa* A. F. Hill (= *A. arabica*) (Leguminosae) b WAf 1)  
*Acacia socotrana* Balf. f. (Leguminosae) b So  
*Acacia zygia* L. (Leguminosae) b Af  
*Acanthus montanus* T. Ana. (Acanthaceae) C  
*Achyranthes aspera* L. (Amaranthaceae) d P (6.4%)  
*Acnida cuspidata* Bert. (= *A. cannabina* L.) (Amaranthaceae) d Am  
*Acronychia paniculata* Miq. (Rutaceae) a SEA  
*Adenia cissampeloides* Harms (Passifloraceae) c Af  
*Adenia venenata* Forsk. (Passifloraceae) c CAF  
*Adenocalymna alliaceum* Miers (Bignoniaceae) g SAM  
*Aegiceras corniculatum* Blanco (Myrsinaceae) b Io  
*Aerva javanica* Juss. (= *A. tomentosa*) (Amaranthaceae) d WAf I  
*Aerva lanata* Juss. (Amaranthaceae) d Ce WAf EAF  
*Aerva tomentosa* Forsk. (Amaranthaceae) d Af  
*Afraegle paniculatum* Engl. (Rutaceae) a Af  
*Aframomum granum-paradisi* K. Schum. (= *Amomum gr.*) (Zingiberaceae) d Af  
*Aframomum giganteum* K. Schum. (= *Amomum gig.*) (Zingiberaceae) d Af  
*Afromendoncie gilgiana* Lind. (Acanthaceae) C  
*Afzelia africana* Smith (Leguminosae) a Af  
*Afzelia quanzensis* Welw. (Leguminosae) a Af  
*Aganosma marginata* G. Don (Apocynaceae) c T  
*Agelaea hirsuta* de Wild. (Connaraceae) C  
*Aglasnema pictum* Kunth (Araceae) d M  
*Aizoon canariense* L. (Aizoaceae) d Af  
*Alafia lucida* Stapf. (Apocynaceae) c C  
*Albizzia gemmifera* C. A. Smith (Leguminosae) a Af

*Albizzia procera* Benth. (Leguminosae) a SEA  
*Albizzia zygia* J. F. Mackr. (Leguminosae) a Af  
*Alepidea* spp. (Umbelliferae) Af  
*Allmania albida* R.Br. (Amaranthaceae) d SEA  
*Allmania nodiflora* R. Br. (Amaranthaceae) d Ce Ph (1.1%)  
*Allophylus olnifolius* Radlk. (Sapindaceae) Af  
*Aloe baumii* Engl. et Gilg. (Liliaceae) d An 2)  
*Aloe saponaria* Haw. (Liliaceae) d Af  
*Aloe vaombe* Dec. et Forsk. (Liliaceae) d 3)  
*Altingia excelsa* Nor. (Hamamelidaceae) a SEA  
*Amaralia calicina* K. Schum. (Rubiaceae) C  
*Ambrosia maritima* L. (Compositae) f C  
*Amphiblemma willdemanium* Cogn. (Melastomataceae) C  
*Ansinkia lycopsioides* Lehm. (Boraginaceae) d Ca  
*Anadendrum montanum* Schott. (Araceae) d M  
*Anaetochilus* spp. (Orchidaceae) d M  
*Aneilema dregeanum* Kunth. (Commelinaceae) d Af  
*Aneilema malabaricum* Merr. (Commelinaceae) d SEA  
*Aneilema nudiflorum* R. Br. (Commelinaceae) d M  
*Aneilema spiratum* R. Br. (Commelinaceae) d SEA  
*Aniseia martinicensis* Choisy (Convolvulaceae) c M  
*Annesorhiza flagellifer* Berth. Davy (Umbelliferae) Af  
*Anobis hirsuta* Miq. (Rubiaceae) d SEA  
*Anthericum subpetiolatum* Baker (Liliaceae) d Af  
*Aporosa maingayi* Hook. f. (Euphorbiaceae) a M  
*Ardisia crispa* A. DC (Myrsinaceae) b M  
*Ardisia laevigata* Bl. (Myrsinaceae) b Io  
*Ardisia littoralis* Andi. (Myrsinaceae) b M  
*Ardisia solanacea* Roxb. (= *A. humilis* Vahl) (Myrsinaceae) b I  
*Argemone mexicana* L. (Papaveraceae) d Af  
*Argyrea populifolia* Choisy (Convolvulaceae) d Ce I  
*Aristida gracilior* Pilq. (Gramineae) Af  
*Aristida plumosa* L. (Gramineae) Af  
*Aristida stipoides* Lam. (Gramineae) Af  
*Artanema angustifolium* Benth. (Scrophulariaceae) d Af  
*Arthrocnemum indicum* Moq.? Del. (Chenopodiaceae) I  
*Arthrocnemum pachystachyum* Bunge (Chenopodiaceae) I  
*Arthrosolen* spp. (Thymelaeaceae) Af  
*Asclepias affinis* de Wild. (Asclépiadiaceae) Af  
*Asphodelus tenuifolius* Cav. (Liliaceae) NAF  
*Aster amellus* L. (Compositae) d NE (3%)  
*Asteracantha longifolia* Nees. (= *Hygrophila spinosa*) (Acanthaceae) I (3%)  
*Astragalus abyssinicus* A. Rich. (Leguminosae) Af  
*Astromia papetaria* Blume (Melastomataceae) a Po Io 4)  
*Attractylis gummifera* L. (Compositae) NAF

*Barleria opaca* Nees. (Acanthaceae) b Af  
*Barleria talbotii* S. Moore (= *B. brownei* S. Moore) (Acanthaceae) b Af  
*Barringtonia acutangula* Gaertn. (Lecythidaceae) a SEA (2.2%)  
*Barringtonia asiatica* Kurz. (Lecythidaceae) a T  
*Barringtonia fusiformis* King (Lecythidaceae) a M  
*Barringtonia insignis* Miq. (Lecythidaceae) a SEA  
*Barringtonia racemosa* Roxb. (Lecythidaceae) a M  
*Barringtonia spicata* Bl. (Lecythidaceae) a SEA (2.6%)  
*Bassia latifolia* Roxb. (Sapotaceae) a 5)  
*Bassia longifolia* L. (= *Maahuca*) (Sapotaceae) a 5)  
*Boerlagiendron palmatum* Harms (Araliaceae) b Io  
*Borreria hispida* K. Schum. Cf. *Spermacoce hispida*  
*Boscia angustifolia* A. Rich. (Capparidaceae) b Af  
*Boscia salicifolia* Oliv. (Capparidaceae) a Af  
*Boscia senegalensis* Lam. (Capparidaceae) a Af  
*Boucerosia aucheriana* Decne (Asclepidiaceae) c I  
*Bougainvillea* spp. (Nyctaginaceae) c Waf  
*Boussaingaultia baselloides* HBK (Chenopodiaceae) d Ce  
*Breynia discigera* Muell. Arg. (Euphorbiaceae) a M  
*Breynia reclinata* Hook. f. (Euphorbiaceae) b M  
*Bridelia scleroneura* Muell. Agr. (Euphorbiaceae) a Af  
*Brillantaisia alata* Anders. (Acanthaceae) d C  
*Bromelia karatas* L. (Bromeliaceae) d CAM (1.2%) 6)  
*Bromelia pinguin* L. (Bromeliaceae) d CAM (0.9%) 6, 7)  
*Bryonopsis laciniosa* Naud. (= *Bryonia l.*) (Cucurbitaceae) d I  
  
*Cadaba farinosa* Forsk. (Capparidaceae) (= *C. indica* Lam.) b Su (7.5%) 8)  
*Calandrina micrantha* Schlecht. (Portulacaceae) d Me (2.2%)  
*Calathea macrosepala* K. Schum. (Marantaceae) d CAM (1.8%)  
*Calligonum polygonoides* L. (Convolvulaceae) b 5)  
*Calonyction aculeatum* House (= *Ipomoea alba*) (Convolvulaceae) c P  
*Calonyction bona-nox* Boj. (= *Ipomoea bona-nox*) (Convolvulaceae) c I  
*Calonyction muricatum* G. Don (Convolvulaceae) d I (1.3%)  
*Canthium* spp. (= *Plectronia*) (Rubiaceae) Af  
*Capsella bursa-pastoris* Medik. (Cruciferae) d Naf NE (4.5%)  
*Caralluma dalsiclii* N. E. Brown (Asclepidiaceae) Waf  
*Caralluma europea* N. E. Brown (Asclepidiaceae) Naf  
*Caralluma knobelii* Phill. (Asclepidiaceae) Saf  
*Caralluma moureti* A. Chev. (Asclepidiaceae) (= *C. edulis*) Af  
*Cardamine hirsuta* L. (Cruciferae) d I  
*Cardiospermum grandiflorum* Swartz (Sapindaceae) d Af  
*Cardiospermum halicacabum* L. (Sapindaceae) c I (4.7%)  
*Cedrela sinensis* Juss. (Meliaceae) SEA (5.4%)  
*Celtis integrifolia* Lam. (Ulmaceae) a Nam Af  
*Centaurea pallescens* Del. (Compositae) d NE (2.4%)

*Centella asiatica* Urb. (Umbelliferae) d SEA Cf: *Hydrocotyle asiatica*  
*Centropogon surinamensis* Presl. (Campanulaceae) b SAM Af  
*Cephalandra quinqueloba* Schrad. (= *Coccinia quinqueloba*) (Cucurbitaceae) d Af  
*Ceratonia siliqua* L. (Leguminosae) a NAF  
*Cerbera manghas* L. (Apocynaceae) a Po Io  
*Ceropegia papillata* N. E. Brown (Asclepidiaceae) Af  
*Ceropegia stenantha* K. Schum (Asclepidiaceae) Af  
*Cestrum latifolium* Lam. (Solanaceae) b SAM  
*Champereya griffithii* Hook. f. (Santalaceae) b SEA (7%)  
*Chilocarpus denudatus* Bl. (Apocynaceae) d Io  
*Chlorocoda whitei* Hook. (Asclepidiaceae) C  
*Chlorophora excelsa* Benth. (Moraceae) a Af  
*Cissus barteri* Bl. (Vitaceae) c C  
*Cissus dinklagei* (Vitaceae) Ga  
*Cissus discolor* Bl. (Vitaceae) c SEA  
*Cissus petiolata* Hook. (Vitaceae) C  
*Cissus popuinea* Guill. et Perr. (= *Vitis pallida*) (Vitaceae) WAF (1.3%) 9  
*Cissus producta* Afzel. (= *Vitis producta*) (Vitaceae) c Ga  
*Cissus pseudocaesia* Gild. et Br. (Vitaceae) c Af  
*Cissus quadrangularis* L. (Vitaceae) c Af I  
*Cissus repens* Lam. (Vitaceae) c SEA (1.8%)  
*Cistanche philipea* P. Cont. (= *C. lutea*) (Orobanchaceae) d Af  
*Cleistanthus heterophyllus* Hook. f. (Euphorbiaceae) b M  
*Cleistopholis patens* Engl. et Prantl. (Annonaceae) Af 10  
*Clerodendron minahassae* T. et B. (Verbenaceae) b Io  
*Clerodendron serratum* Spreng. (Verbenaceae) b SEA  
*Clerodendron* spp. (Verbenaceae) b WAF  
*Cochlospermum tinctorium* A. Rich. (Bixaceae) Af 11  
*Cogniauxia podolaena* Baill. (Cucurbitaceae) d Af  
*Coinochlamis angolana* Moore (Loganiaceae) C  
*Colubrina asiatica* Brongn. (Rhamnaceae) b M Io  
*Combretum micranthum* G. Don (Combretaceae) (= *C. altum* Guill.) Ga  
*Combretum mooreanum* Exell. (Combretaceae) a Af  
*Combretum paniculatum* Vent. (Combretaceae) a Af  
*Combretum platyphyllum* Hutch. et Dalz. (Combretaceae) Af  
*Combretum racemosum* F. Beauv. (Combretaceae) g Af  
*Commelina benghalensis* L. (Commelinaceae) d SEA (2.1%)  
*Commelina claessensii* de Wild (Commelinaceae) d C  
*Commelina clavata* C. B. Clarke (Commelinaceae) d Ce  
*Commelina forskalei* Vahl (Commelinaceae) d Af  
*Commelina latifolia* Hochst. (Commelinaceae) d Af  
*Commelina nudiflora* L. (Commelinaceae) d SEA (1.7%)  
*Commelina obliqua* Ham. (Commelinaceae) d SEA  
*Commelina zambezica* DC (Commelinaceae) d Af  
*Commiphora sulcata* Chiov. (Burseraceae) d Af

*Conyza aegyptiaca* Ait. (Compositae) d C  
*Corallocarpus sphaerocarpus* Ait. (Cucurbitaceae) Af  
*Coronopus squamatus* Asch. (Cruciferae) (= *Senebiera coronopus* Poir.) d NE (2.8%)  
*Costus phyllocephalus* K. Schum. (Zingiberaceae) d C  
*Costus speciosus* Smith (Zingiberaceae) d SEA  
*Crataeva adansonii* DC (Capparidaceae) (= *C. religiosa*) a SEA (5.1%)  
*Crataeva macrocarpa* Kurz (Capparidaceae) b Ich  
*Crataeva nurvala* Buch.-Ham. (Capparidaceae) a I B  
*Cratoxylon polyanthum* Korth. (Hypericaceae) a T  
*Crepis aspera* L. (Compositae) d NE (1.9%)  
*Crepis reuteriana* Boiss. et Heldr. (Compositae) d NE (1.3%)  
*Croton mubange* Muell. Arg. (Euphorbiaceae) g C  
*Crotonogyne poggei* Pax (Euphorbiaceae) C  
*Crypteronia paniculata* Bl. (Crypteroniaceae) a SEA  
*Cryptolepis nigritans* Cf: *Ectadiopsis*  
*Cryptotaenia canadensis* A. DC (Umbelliferae) d P  
*Cucumella robecchii* Chiov. (Cucurbitaceae) d Af  
*Cudrania javensis* Trec. (Moraceae) b Io  
*Cuviera angolensis* Walw. (Rubiaceae) C  
*Cyanotis cristata* G. Don (Commelinaceae) d SEA  
*Cyanotis nodiflora* Kunth. (Commelinaceae) d Af  
*Cyathula prostrata* Bl. (Amaranthaceae) d C  
*Cycas circinalis* L. (Cycadaceae) a ! SEA Ph  
*Cycas rumphii* Miq. (Cycadaceae) a ! SEA  
*Cymboseria palestinae* Boiss. (Compositae) d NE (1.2%)  
*Cynanchum ovalifolium* Wight (Asclepidiaceae) d Io  
*Cynanchum pauciflorum* R. Br. (Asclepidiaceae) Ce  
*Cynanchum schistoglossum* Schlecht. (Asclepidiaceae) Af  
*Cynanchum virens* Steud. (Asclepidiaceae) SAf  
*Cynometra reniflora* L. (Leguminosae) a T  
*Cynomorium coccineum* L. (Balanophoraceae) Af  
*Cyrtandra decurrens* de Vr. (Pedaliaceae) d Io  
*Cyrtanthus bicolor* R. A. Dyer (Amaryllidaceae) d Af  
  
*Danmarpopsis kingiana* Warb. (Moraceae) Po (2.4-5%)  
*Daniella olivieri* Hutch. et Dalz. (Leguminosae) a Af  
*Decaspermum fruticosum* Forst. (Myrtaceae) b SEA  
*Deeringia amaranthoides* Merr. (Amaranthaceae) c SEA  
*Delonix alata* Gamble (Leguminosae) a I (7.7%)  
*Dentella repens* Forst. (Rubiaceae) d SEA I (1.9%)  
*Deschidium* spp. (Asclepidiaceae) c Po  
*Dewevrea bilabiata* M. Micheli (Leguminosae) C  
*Dicellandra barteri* Hook. (Melastomataceae) C  
*Dichapetalum* spp. (= *Chailletia* (Chailletiaceae))! Ug.  
*Dicliptera chinensis* Juss. (Acanthaceae) d SEA

*Dicliptera papuana* Warb. (Acanthaceae) d NG 12  
*Dicliptera umbellata* Juss. (Acanthaceae) Af  
*Digera arvensis* Forsk. (Amaranthaceae) (*D. muricata* = *D. alternifolia*) d I Af  
*Digitaria gayana* A. Chev. (Gramineae) d Af  
*Dinophora spenneroides* Benth. (Melastomataceae) Ga  
*Diplotaxis duveyrierana* Coss. (Cruciferae) d Af  
*Diplotaxis pendula* DC (Cruciferae) d Af  
*Dipteracanthus longifolia* Hochs (Acanthaceae) (= *Ruella longifolia*)  
*Dissotis decumbens* Triana (Melastomataceae) d C  
*Dissotis hassii* Cogn. (Melastomataceae) d C  
*Dissotis multiflora* Triana (Melastomataceae) d SEA  
*Dissotis prostrata* Triana (Melastomataceae) (= *D. rotundifolia*) d SEA Af  
*Dissotis rotundifolia* (Melastomataceae) d Ga  
*Dissotis sylvestris* J. Felix (Melastomataceae) d SEA Af  
*Dobera roxburghii* Planch. (Salvadoraceae) (= *D. glabra* A. DC) Af  
*Dorstenia* spp. (Urticaceae) d Af  
*Dregia volubilis* Benth. (Asclepidiaceae) d Ce  
*Duvalia polita* N. E. Brown (Asclepidiaceae) SAF  
*Dysoxylum euphlebiium* Merr. (Leguminosae) c g Io

*Echinochloa crus-galli* Beauv. (Gramineae) d Io  
*Eclipta alba* Hassk. (Compositae) (= *E. prostrata* L.) d I SEA (2.3%)  
*Ectadiopsis oblongifolia* Schlecht. (Asclepidiaceae) (= *Cryptolepis nigritans*) Af  
*Ehretia orbicularis* Hutch. et Bruce (Boraginaceae) Af  
*Eichhornia crassipes* Solme (Pontederiaceae) h P (1.3%)  
*Elatostemma* spp. (Urticaceae) d Ph  
*Embelia philippinensis* A. DC (Myrsinaceae) c Ph  
*Embelia ribes* Burm. f. (Myrsinaceae) c SEA  
*Emex spinosus* Campd. (Polygalaceae) L  
*Enhydra fluctuans* Lour. (Compositae) h SEA (3.5%)  
*Entada phaseloides* Merr. (Leguminosae) c Io  
*Entada scandens* Benth. (Leguminosae) a C  
*Erigeron sumatrensis* Retz. (Compositae) d M  
*Erioglossum rubiginosum* Bl. (Rutaceae) b SEA  
*Erodium moschatum* L' Hér. (Geraniaceae) d NE (2.5%)  
*Euthulia conyroides* L. (Compositae) d EAF  
*Euadenia trifoliata* Benth. et Hook. (Capparidaceae) b Af 8)  
*Evodia lucida* Miq. (Rutaceae) b Io

*Fadogia cienkowskii* Schweinf. (Rubiaceae) Af GC  
*Fagara leprieurii* Engl. (Rutaceae) (= *F. angolensis* = *F. nitens* = *Zanthoxylum?*) a Af  
*Fagara olitoria* Engl. (Rutaceae) a Af  
*Fedia cornucopiae* Gaertn. (Valerianaceae) d Af  
*Fernaldia pandurata* R. E. Woodson (Apocynaceae) Am (2.6%) 2)  
*Finlaysonia maritima* Backer (Asclepidiaceae) c Io

*Finlaysonia obovata* Wall. (Asclepidiaceae) c Io  
*Flemingia macrophylla* Kuntze (Leguminosae) b I 1  
*Fleurya aestuans* Gaud. (Urticaceae) d C 8  
*Fleurya ovalifolia* Dandy (Urticaceae) d Af  
*Fleurya podocarpa* Wedd. (Urticaceae) d C  
*Floscopa schweinfurthii* G. B. Cl. (Commelinaceae) d GC  
*Forrestia glabrata* Hassk. (Commelinaceae) d SEA  
*Forrestia marginata* Hassk. (Commelinaceae) d SEA  
*Forrestia mollissima* Kds (Commelinaceae) d SEA

*Galinsoga parviflora* Cav. (Compositae) d P (3.2%)  
*Geophila obvallata* T. Didr. (Rubiaceae) Af  
*Gisekia pharmaceoides* L. (Phytolaccaceae) d C  
*Glinus lotoides* Loeffl. (Aizoaceae) (= *Mollugo hirta*) d Af  
*Gliricidia maculata* HBK (Leguminosae) a P  
*Gliricidia sepium* Steud. (Leguminosae) a P  
*Gloriosa virescens* Lindl. (Liliaceae) c C  
*Glossocardia bosvallia* DC (Compositae) (= *G. cinarifolia* Cass.) d I  
*Glossonema boveanum* Decne (Asclepidiaceae) (= *G. nubicum*) d Af  
*Glossonema varians* Benth. (Asclepidiaceae) I  
*Glyphaea lateriflora* Monach. (Tiliaceae) b Af 13  
*Gomphrocarpus albens* Decne (Asclepidiaceae) Af  
*Gonocrypta graevei* Baill. (Asclepidiaceae) Mg  
*Grewia carpinifolia* Juss. (Tiliaceae) a Af  
*Grewia corylifolia* A. Rich. (Tiliaceae) a Af  
*Grewia mollis* Juss. (Tiliaceae) a Af  
*Grewia retusa* Chiov. (Tiliaceae) a Af  
*Grewia villosa* Willd. (Tiliaceae) a Af  
*Grumilea ungoniensis* K. Schum. et Krause (Rubiaceae) Af  
*Guiera senegalensis* J. F. Gmel. (Combretaceae) a Af

*Habenaria* spp. (Orchidaceae) d Io  
*Hausmaniastrum lilacinum* J. K. Morton (Labiatae) (= *Acrocephalus lil.*) d Af  
*Heckeria peltata* Kunth. (Piperaceae) b P  
*Heckeria umbellata* Kunth. (Piperaceae) b SEA  
*Hedyotis auricularia* L. (Rubiaceae) d M Ce  
*Hedyotis scandens* Roxb. (Rubiaceae) Cf: *Oldenlandia scandens*  
*Hedyotis polymorpha* DC (Compositae) Af  
*Heinsia crinita* G. Tayl. (Rubiaceae) a Af  
*Heinsia pulchella* K. Schum. (Rubiaceae) a ENi 3L  
*Helicia javanica* Bl. (Proteaceae) a SEA  
*Helicia serrata* Bl. (Proteaceae) a SEA  
*Heritiera minor* L. (Sterculiaceae) (= *H. fomes*) a I  
*Heteranthera reniformis* Ruiz et Pav. (Pontederiaceae) d CAm (0.9%)  
*Hoglundia oppositifolia* Vahl (Labiatae) d C

- Holostemma annularis* K. Schum. (Asclepiaceae) c I  
*Houttuynia cordata* Thunb. (Piperaceae) d I (4.1%)  
*Hydrella* spp. (Hydrocharitaceae) h I (4.3%)  
*Hydrocharis dubia* Backer (Hydrocharitaceae) d SEA  
*Hydrocotyle* (= *Centella*) *asiatica* L. (Umbelliferae) d SEA (1.3-2.3%)  
*Hydrocotyle javanica* Thunb. (Umbelliferae) ! d SEA (1.2%)  
*Hydrocotyle sibthorpioides* Lam. (Umbelliferae) d SEA  
*Hydrolea zeylanica* Vahl (Hydrophyllaceae) h SEA  
*Hydrolea* spp. (Hydrophyllaceae) h I (6.5%)  
*Hygrophila auriculata* Heyne (Acanthaceae) d Af  
*Hygrophila quadrivalvis* Nees (Acanthaceae) d M  
*Hygrophila salicifolia* Nees (Acanthaceae) d I  
*Hygrophila serpyllum* T. And. (Acanthaceae) d I  
*Hygrophila thomsoni* de Wild (Acanthaceae) d C  
*Hymenocardia acida* Tul. (Euphorbiaceae) b C  
*Hymenocardia ulmoides* Oliv. (Euphorbiaceae) b C  
*Hyoseris radiata* L. (Compositae) L  
*Hyparrhenia* spp. (Gramineae) (= *Andropogon* spp.) Af  
*Hypoestes verticillaris* R. Br. (Acanthaceae) Af
- Impatiens balsamina* L. (Geraniaceae) d Io  
*Impatiens dichroa* Hook. f. (Geraniaceae) d C  
*Impatiens flaccida* Arn. (Geraniaceae) d Ce  
*Inula crithmoides* L. (Compositae) d NE (0.9%)  
*Inversodicraea minutiflora* H. Perrier (Podestemonaceae) C  
*Inversodicraea schlechteri* Engl. (Podestemonaceae) h C  
*Isachne albens* Trin. (Gramineae) d SEA 14  
*Isachne globosa* O. Ktze (Gramineae) d SEA 14  
*Isonema smeathmannii* Roem. et Schult. (Apocynaceae) b Af SL
- Jacquemontia tannifolia* Gris. (Convolvulaceae) (= *J. capitata* G. Don) d Am Af  
*Jussieua abyssinica* Dandy et Bren. (Onagraceae) d Af  
*Jussieua repens* L. (Onagraceae) d P (2.5%)
- Kleinhovia hospita* L. (Sterculiaceae) a Ph Cb  
*Klugia notoniana* A. DC (Gesneriaceae) SEA  
*Koelpinia linearis* Pallas (Compositae) Af
- Lagerstroemia macrocarpa* Wall. (Lythraceae) (= *L. speciosa* Pers.) a T  
*Laggera elata* Sch. Rip. (Compositae) C WAF  
*Languas* spp. (= *Alpinia*) (Zingiberaceae) d M  
*Lankestonia barteri* Hook. f. (Acanthaceae) C  
*Lantana camara* L. (Verbenaceae) b P  
*Lantana salvifolia* Jacq. (Verbenaceae) b C  
*Laportea terminalis* Wight (Urticaceae) b I

*Lasia spinosa* Thw. (Araceae) h SEA (2.1%)  
*Launea nuda* Hook. f. (Compositae) d NE  
*Leea edgeworthii* Satt. (Vitaceae) (= *L. aspera* M. Lawson) c I  
*Leea guineensis* (Vitaceae) a WAF  
*Leea macrophylla* Roxb. (Vitaceae) c I  
*Lemma minor* L. (Lemnaceae) h P (2.1%)  
*Leptadenia hastata* Decne (Asclepiadiaceae) (= *L. lancifolia* Decne) c Af (4.4%)  
*Leptadenia pyrotechnica* Decne (= *L. spartum* Wight) (Asclepiadiaceae) Af I  
*Leptadenia reticulata* Wight et Arn. (Asclepiadiaceae) c I  
*Letisionia elliptica* Wight Cf: *Argyrea populnifolia*  
*Leucas lavandifolia* Smith (Labiatae) d g Io  
*Leucas zeylanica* R. Br. (Labiatae) d g Ce  
*Limnopsis loangensis* Engl. (Menispermaceae) Af  
*Limnanthemum indicum* Thw. (Gentianaceae) d I 15)  
*Limnophila aromatica* Meir. (Scrophulariaceae) h SEA (1.5%)  
*Limnophila conferta* Benth. (Scrophulariaceae) h I  
*Limnophila erecta* Benth. (Scrophulariaceae) h SEA  
*Limnophila indica* Druce (Scrophulariaceae) h I  
*Limnophila roxburghii* G. Don (Scrophulariaceae) h Ph  
*Limnophila rugosa* Merr. (Scrophulariaceae) h SEA  
*Lobelia alsinoides* Lam. (Campanulaceae) (= *L. tetragona*) d I  
*Lobelia fervens* Thunb. (Campanulaceae) d Af  
*Lobelia filiformis* Lam. (Campanulaceae) d Af  
*Lobelia succulenta* Bl. (Campanulaceae) d SEA  
*Lochnera pusilla* K. Schum. (Apocynaceae) d I  
*Lochnera rosea* L. f. (Apocynaceae) d C  
*Loranthus* spp. (Loranthaceae) Af  
*Ludwigia repens* L. (Onagraceae) d Af ICh  
*Lumnitzera racemosa* Willd. (Combretaceae) a SEA Po (1.7%)

*Maerua angolensis* DC (Capparidaceae) a Ni  
*Maerua crassifolia* Forsk. (Capparidaceae) Af  
*Maesa blumei* Alph. DC (Myrsinaceae) b SEA  
*Maesa chista* D. Don (Myrsinaceae) a I  
*Maesa indica* Wall. (Myrsinaceae) a I  
*Maesobotrya bertramiana* Buttn. (Euphorbiaceae) C  
*Maesobotrya floribunda* Benth. (Euphorbiaceae) Af  
*Maesobotrya hirtella* Pax (Euphorbiaceae) Af  
*Maprounea africana* Muell. Arg. (Euphorbiaceae) C  
*Maprounea membranacea* Pax et Hoffm. (Euphorbiaceae) C  
*Marumia muscosa* Bl. (Melastomataceae) c SEA  
*Medinilla hasseltii* Bl. (Melastomataceae) b SEA  
*Medinilla rubicunda* Bl. (Melastomataceae) b I  
*Melaleuca leucadendron* L. (Myrtaceae) a T  
*Melastoma malabathricum* L. (Melastomataceae) b SEA

*Melastoma* spp. (Melastomataceae) Af  
*Meliantha suavis* Pierre (Olacaceae) !! b T  
*Meliosma pinnatu* Roxb. (Sabiaceae) a I  
*Melochia corchorifolia* L. (Sterculiaceae) d I Af  
*Melothria heterophylla* Cogn. (Cucurbitaceae) c I  
*Memecylon coeruleum* Jack. (Melastomataceae) b I  
*Merremia emarginata* Hall. f. (Convolvulaceae) d I  
*Merremia rhyncorhiza* Hall. f. (Convolvulaceae) d I  
*Merremia umbellata* Hall. (Convolvulaceae) d Io  
*Micrococca mercurialis* Benth. (Euphorbiaceae) C  
*Microdesmis pentandra* Hook. f. (Euphorbiaceae) C  
*Microdesmis puberula* Hook. f. (Euphorbiaceae) a C  
*Microdesmis zenkeri* Pax (Euphorbiaceae) C  
*Microglossa afzelii* O. Hoffm. (Compositae) d f? SL  
*Mikania cordata* B.L. Robinson (Compositae) d Af  
*Mikania scandens* Willd. (Compositae) d C  
*Millettia sericea* W. et A. (Leguminosae) c SEA  
*Mischocarpus sundaicus* Blume (Sapindaceae) (= *Cupania lessertiana*) a I  
*Modiola caroliniana* G. Don (Malvaceae) Am (2.2%)  
*Mohlana latifolia* Miq. (Phytolaccaceae) C  
*Mollugo nudicaulis* Lam. (Aizoaceae) d C  
*Mollugo oppositifolia* L. (Aizoaceae) d SEA (3.4-3.9%)  
*Mollugo pentaphylla* L. (Aizoaceae) d SEA  
*Monochoria hastaeifolia* Presl. (Pontederiaceae) h Ce Ph  
*Monochoria hastata* Solms (Pontederiaceae) h SEA (0.5-1.4%)  
*Monochoria vaginalis* Presl. (Pontederiaceae) h SEA  
*Muscari comosum* Mill. (Liliaceae) d L  
*Mussaenda arcuata* Poir. (Rubiaceae) b Af  
*Mussaenda frondosa* L. (Rubiaceae) c SEA  
*Mussaenda glabra* Vahl. (Rubiaceae) b M  
*Mussaenda roxburghii* Hook. f. (Rubiaceae) b I  
*Mussaenda stenocarpa* Hiern. (Rubiaceae) b C  
*Myriactis wallichii* L. (Compositae) d I  
*Myrianthus arboreus* P. Beauv. (Moraceae) a Waf  
*Myrianthus libericus* Rendle (Moraceae) b Waf  
*Myrtillocactus geometricans* Cons. (Cactaceae) b Am 2)

*Nauclea latifolia* Sm. (Rubiaceae) Cf: *Sarcocephalus*  
*Nelsonia brunelloides* O.K. (Acanthaceae) C  
*Neptunia oleracea* Lour. (Leguminosae) h T  
*Neptunia prostrata* Baill. (Leguminosae) h Af A (3.5%)  
*Nesaea* spp. (Lythraceae) Af  
*Nidorella macrocephala* Steetz. (Compositae) Af  
*Nopalea coccinellifera* Solms-Dyck (Cactaceae) b Am (1.3%)

*Ocathocharis borneensis* Blume (Melastomataceae) b M Io  
*Olax scandens* Roxb. (Olacineae) a g SEA (4%)  
*Oldenlandia lancifolia* Schw. (Rubiaceae) d Af  
*Oldenlandia macrophylla* DC (Rubiaceae) d Gh  
*Oldenlandia scandens* K. Schum. (Rubiaceae) c I  
*Operculina turpethum* S. Manso (Convolvulaceae) d Ph (3.9%)  
*Opuntia subulata* Engelm. (Cactaceae) b Am  
*Opuntia* spp. (Cactaceae) b Am (1.1%)  
*Ormocarpum* spp. (Leguminosae) Af  
*Ornopodon* spp. (Compositae) Af  
*Oroxylum indicum* Vent. (Bignoniaceae) a SEA  
*Ottelia alismoides* Pers. (Hydrocharitaceae) h Ph  
*Ouratea arnoldiana* de Wild. et Th. Dur. (Ochnaceae) C  
*Ouratea leptoneura* Gilq. (Ochnaceae) (= *Gomphia*) Af  
*Ouratea* spp. (Ochnaceae) Af  
*Oxygonum atriplicifolium* Mart. var. *sinuatum* (Polygonaceae) d Af

*Pacourina edulis* Aubl. (Compositae) h Gu  
*Paederia foetida* L. (Rubiaceae) c SEA  
*Paederia verticillata* DC (Rubiaceae) c SEA  
*Pancratium trianthum* Herb. (Amaryllidaceae) d Af  
*Pandanus latifolius* (Pandanaceae) b f Ce  
*Pandanus odoratus* Ridley (Pandanaceae) b f M  
*Pandanus polycephalus* Lam. (Pandanaceae) b Mo  
*Pandanus tectorius* L. (Pandanaceae) b Io Po 16)  
*Pangium edule* Reinw. (Flacourtiaceae) ! a SEA  
*Panicum barbatum* Lam. (Gramineae) d SEA 17, 18)  
*Panicum chamaeraphioides* Hack. (Gramineae) d SEA 19)  
*Panicum colonum* L. (Gramineae) d SEA 17)  
*Panicum crus-galli* L. (Gramineae) d SEA 18)  
*Panicum palmifolium* Koenig (Gramineae) (= *Selaria*) d SEA 18)  
*Papaver syriacum* Boiss. et Blanch. (Papaveraceae) (= *P. rhoas*?) d NE (3.9%)  
*Passiflora foetida* L. (Passifloraceae) c P  
*Passiflora lunata* Willd. (Passifloraceae) c P  
*Paullinia pinnata* L. (Sapindaceae) (= *P. africana* Don) ! C  
*Pavetta crassipes* K. Schum. (Rubiaceae) b Af  
*Pavetta esculenta* de Wild. (Rubiaceae) C  
*Pedaliium murex* L. (Pedaliaceae) Af  
*Peireskia aculeata* Plum. (Cactaceae) c P  
*Peireskia bleo* DC (Cactaceae) c P  
*Peireskia panamaensis* Seem. (Cactaceae) c CAM  
*Pemphis acidula* Forst. (Lythraceae) a Io Po  
*Pentanisia schweinfurthii* Hiern. (Rubiaceae) Af  
*Pentaphragma begoniaefolium* Wall. (Campanulaceae) d SEA (1.9%)  
*Pentarrhinum insipidum* E. Mey (Asclepiadiaceae) SAF

*Pergularia africana* N. E. Br. (Asclepidiaceae) C  
*Pergularia daemia* Chiov. (Asclepidiaceae) SAf  
*Pergularia extensa* N. E. Br. (Asclepidiaceae) WAF  
*Periploca aphyllia* Decne (Asclepidiaceae) c Af 13)  
*Petasites japonicus* F. Schmidt (Compositae) d Ja  
*Petasites palmatus* Ase Gray (Compositae) d Ca  
*Petasites* spp. (Compositae) d Pa  
*Petunga microcarpa* DC (Rubiaceae) b Io  
*Peucedanum capense* Sond. (Umbelliferae) d Af Cf: *Apium*  
*Phaeone iron dicellandroides* Gilg. (Melastomataceae) C  
*Phrynium confertum* K. Schum. (Marantaceae) d C  
*Phytolacca abyssinica* Hoffm. (Phytolaccaceae) ! d EAF  
*Phytolacca acinosa* Roxb. (Phytolaccaceae) ! d I  
*Phytolacca decandra* L. (Phytolaccaceae) ! d NAM  
*Phytolacca dodecandra* l'Hér. (Phytolaccaceae) ! d GC  
*Phytolacca esculenta* van Houte (Phytolaccaceae) !  
*Phytolacca octandra* L. (Phytolaccaceae) (= *Ph. americana*) ! d P  
*Phytolacca rivinoides* Kunth et Bouché (Phytolaccaceae) ! d SAM Af  
*Pilea glaberrima* L. (Urticaceae) d SEA  
*Pilea melastomoides* Bl. (Urticaceae) (= *P. trinervis* Wight) d SEA  
*Piliostigma malabaricum* Benth. (Leguminosae) b T  
*Piliostigma reticulatum* Hochst. Cf: *Bauhinia reticulata*  
*Pimenta acris* Kostel (Myrtaceae) a Af  
*Pimenta dioica* Merr. (Myrtaceae) a g CAM SAM  
*Pistia stratiotes* (Araceae) h Su Ch  
*Planchonia grandis* Ridl. (Lecythidaceae) a M  
*Planchonia valida* Bl. (Lecythidaceae) a SEA  
*Platystoma africanum* P. Beauv. (Labiatae) d C  
*Podostemon minutiflorus* Benth. et Hook. (Podostemonaceae) Af  
*Polakowskia tacaco* Pitt. (Cucurbitaceae) d SAM  
*Polanisia hirta* Pax (Capparidaceae) d C  
*Polanisia viscosa* L. (Capparidaceae) (= *Cleome viscosa*) d  
*Pouzolzia guineensis* Benth. (Urticaceae) C  
*Pouzolzia zeylanica* Benn. (Urticaceae) M  
*Premna divaricata* Wall. (Verbenaceae) b M  
*Premna integrifolia* L. (Verbenaceae) b Io T  
*Premna odorata* Blanco (Verbenaceae) (= *P. pubescens* Bl.) a g Ph (5.3%)  
*Protium javanicum* Burm. f. (Burseraceae) a Io  
*Pseuderanthemum bicolor* Radlk. (Acanthaceae) b Ph (3.4%)  
*Pseuderanthemum racemosum* Radlk. (Acanthaceae) b SEA (3.5%)  
*Pseuderanthemum reticulatum* Radlk. (Acanthaceae) b Ph  
*Pseudospondias microcarpum* Engl. (Anacardiaceae) a C  
*Psorospermum tenuifolium* DC (Hypericaceae) C  
*Psychotria kisantuensis* de Wild. (Rubiaceae) C  
*Pterocarpus erinaceus* Poir. (Leguminosae) aAf

*Pterocarpus lucens* Lepr. (Leguminosae) a Af  
*Pterocarpus santaloides* l'Hér. (Leguminosae) a Af 9)  
*Ptychopetalum alliaceum* de Wild. (Olacaceae) C  
*Pycnobotrya nitida* Benth. (Apocynaceae) C

*Quamoclit pinnata* Boyer (Convolvulaceae) (= *Ipomoea quamoclit*) c P

*Radermachera fimbriata* (Bignoniaceae) (= *Stereospermum* DC) a T  
*Randia octomera* Benth. et Hook. (Rubiaceae) a C  
*Ranunculus multifidus* Forsk. (Ranunculaceae) d Af  
*Rapistrum rugosum* All. (Cruciferae) d NE (4.1%)  
*Ravenala madagascariensis* Sonn. (Musaceae) a Mg 16)  
*Ravenia robustior* Jum. et Perr. (Rubiaceae) Af 20)  
*Renanthera moluccana* Bl. (Orchidaceae) d Io  
*Rhaphidophora lobbii* Schott. (Araceae) c M  
*Rhaponticum acaule* DC (Compositae) (= *Centaurea chamaerhaponticum*) d Ly 7)  
*Rhinacanthus calcaratus* Nees. (Acanthaceae) B  
*Rhizophora mucronata* Lam. (Rhizophoraceae) i P  
*Rhynchelythrum repens* C. E. Hubb. (Gramineae) d Af  
*Richardsonia brasiliensis* Gomez (Rubiaceae) Am Io  
*Rivea ornata* Choisy (Convolvulaceae) d 5)  
*Rorippa* spp. Cf: *Nasturtium*  
*Rubia cordifolia* L. (Rubiaceae) c SEA  
*Rubus rosaefolius* Sm. (Rosaceae) c SEA  
*Rungia grandis* T. And. (Acanthaceae) C  
*Rungia klossii* S. Moore (Acanthaceae) d NG 12)

*Salacia pynaertii* de Wild. (Celastrinaceae) Af  
*Salicornia arabica* L. (Salicorniaceae) d NAF  
*Salicornia perrieri* A. Chev. (Salicorniaceae) d NAF  
*Salvadora persica* L. (Salvadoraceae) a Af I  
*Salvia verbenaca* L. (Labiatae) d Af  
*Saraca indica* L. (Leguminosae) (= *S. bijuga* Prain) a T  
*Sarcocephalus esculentus* Afzel. (Rubiaceae) a Af 2)  
*Sarcocephalus orientalis* Merr. (Rubiaceae) a SEA  
*Sarcocephalus russeggeri* Kotschy (Rubiaceae) a Af 2)  
*Sarcocephalus undulatus* Miq. (Rubiaceae) a SEA  
*Sarcophrynium arnoldianum* de Wild. (Marantaceae) d C  
*Sarcostemma viminalis* R. Br. (Asclepiadiaceae) Af 21, 22)  
*Sauvagesia erecta* L. (Ochnaceae) d C  
*Scandix iberica* Biel. (Umbelliferae) d NE (1.2%)  
*Schefflera aromatica* Harms (Araliaceae) b g SEA  
*Schismatoglottis calyptata* Zoll. et Mor. (Araceae) d SEA  
*Schleichera oleosa* Merr. (Sapindaceae) a SEA  
*Schwenkia americana* L. (Solanaceae) d Af

*Scleria tessellata* Willd. (Cyperaceae) d SEA 17)  
*Sclorodocarpus borneensis* Becc. (Olacaceae) a f M  
*Secamone* spp. (Asclepiadiaceae) ! d Af  
*Securidaca longipedunculata* Fruw. (Polygaleae) a Et  
*Senecarpus cassuvium* Roxb. (Anacardiaceae) a Io  
*Senebiera coronopus* Poir. (Cruciferae) d P  
*Senebiera lepidioides* Coss. et Dur. (Cruciferae) d NAF  
*Senebiera pinnatifida* DC (Cruciferae) Ca  
*Senecio biafrae* Olw. et Hiern. (Compositae) Cf: *Crassocephalum biafrae*  
*Senecio congolensis* de Wild. (Compositae) d C  
*Senecio gabonensis* (Compositae) d Ga  
*Sericostachys scandens* Gilq. et Lepr. (Amaranthaceae) d C  
*Sesuvium portulacastrum* L. (Aizoaceae) d P (2.1%)  
*Setaria palmifolia* (Gramineae) d NG 12)  
*Silene aegyptiaca* L. (Caryophyllaceae) d NE  
*Silybum marianum* Gaertn. (Compositae) d NAF  
*Smilax leucophylla* Blume (Liliaceae) c M  
*Smithia elliotti* Bak. f. (Leguminosae) b Af  
*Smithia sensitiva* Ait. (Leguminosae) d M  
*Selenostemon ocymoides* Schum. (Labiatae) d GC  
*Sonneratia acida* L. f. (Sonneratiaceae) a SEA  
*Sonneratia alba* Smith (Sonneratiaceae) a SEA  
*Sparganophora vaillantii* Gaertn. Cf: *Struchium sparganophora*  
*Spatiphyllum commutatum* Schott. (Araceae) d SEA  
*Spatiphyllum phrynifolium* Schott. (Araceae) d SAM (6.3%)  
*Spermacoce hispida* L. (Rubiaceae) (= *Borreria hispida*) d SEA  
*Sphaerosicyos sphericus* Hook. f. (Cucurbitaceae) d Af  
*Sphaerostylax heteromorphe* Baill. (Podestemonaceae) h C  
*Sphenoclea zeylanica* Gaertn. (Campanulaceae) d SEA  
*Stachytarpheta indica* Vahl (Verbenaceae) d P  
*Stachytarpheta jamaicensis* Vahl (Verbenaceae) d SAM  
*Stachytarpheta* spp. (Verbenaceae) d Af  
*Stapelia kwebensis* N. E. Br. (Asclepiadiaceae) SAF  
*Statice thonini* Viv. (Plumbaginaceae) d L  
*Staurogyne elongata* O. Ktze (Acanthaceae) d SEA  
*Stellaria aquatica* Cyr. (Caryophyllaceae) d I  
*Stellaria media* Cyr. (Caryophyllaceae) d NE (1.2%)  
*Sterculia appendiculata* Engl. (Sterculiaceae) a Af  
*Sterculia tragacantha* L. (Sterculiaceae) a WAF  
*Stereospermum fimbriatum* DC (= *Radermachera fimbriata*) a T  
*Striga macrantha* Benth. (Scrophulariaceae) d SL  
*Strombosia javanica* Bl. (Olacaceae) a Io  
*Struchium sparganophora* O. Ktze (Compositae) (= *Sparganophorus vaillantii*) d Af  
*Strychnos spinosa* Lam. (Loganiaceae) a Af  
*Stylochiton hypogeum* Lepr. (Araceae) d Af

*Stylochiton warneckii* Engl. (Araceae) d Af  
*Suaeda maritima* Dumort. (Chenopodiaceae) d P (1.8%)  
*Suaeda nudiflora* Moq. (Chenopodiaceae) d I (2.0%)  
*Symplocos odoratissima* Choisy (Symplocaceae) a SEA  
*Synedrella nodiflora* Gaertn. (Compositae) d Io  
  
*Telosma cordata* Merr. (Asclepiadiaceae) c M 23)  
*Telosma minor* Craib (Asclepiadiaceae) T 2)  
*Teramnus labialis* Spreng. (Leguminosae) c d SEA  
*Tetrapleura tetraptera* Taub. (Leguminosae) (= *T. thomningii*) a Af 24)  
*Tetrastigma hermandii* Pl. (Vitaceae) c Ph  
*Tetrastigma loheri* Gagnep. (Vitaceae) c Ph  
*Thalictrum minus* L. (Ranunculaceae) d SAf  
*Themeda gigantea* Hack. (Gramineae) d SEA 16)  
*Thespesia populnea* Soland. (Malvaceae) a SEA  
*Thunbergia bogoriensis* de Wild. (Acanthaceae) C  
*Thunbergia lancifolia* T. And. (Acanthaceae) Af  
*Thunbergia oblongifolia* Olw. (Acanthaceae) Af  
*Torenia parviflora* Benth. (Serophulariaceae) d C  
*Tournefortia argentea* L. f. (Boraginaceae) a SEA  
*Trema guineensis* Ficalho (Ulmaceae) a Af  
*Trema orientalis* Bl. (Ulmaceae) a SEA  
*Tribulus terrestris* L. (Zygophyllaceae) ! d I EAF (7.2%)  
*Trichodesma ceylanicum* R. Br. (Boraginaceae) Af  
*Triplochiton scleroxylon* K. Schum. (Malvaceae) a Af  
*Tristemma grandiflorum* de Wild. (Melastomataceae) C  
*Triumfetta annua* L. (Tiliaceae) d Af  
*Triumfetta bartramia* L. (Tiliaceae) d M  
*Triumfetta cordifolia* A. Rich. (Tiliaceae) a Af 8)  
*Triumfetta rhomboidea* Jacq. (Tiliaceae) d P 8)  
*Tulbaghia camerooni* Baker (Liliaceae) d Mn  
*Turraea vogelii* Hook. f. (Meliaceae) a C  
*Tylosma fassogiensis* Torre et Hell. (Leguminosae) (= *Bauhinia*) a Af 24)  
*Typha angustifolia* (Typhaceae) d Af  
*Typha capensis* Roxb. (Typhaceae) d Af 7)  
*Typha elephantina* Roxb. (Typhaceae) d Af  
*Uria crinita* Desv. (Leguminosae) d M Sm  
*Urera cameroonensis* Benth. et Hook. f. (Urticaceae) c Af  
*Urera mannii* Wedd. (Urticaceae) c Af  
*Urera obovata* Benth. (Urticaceae) c Af  
*Urospermum picroides* F. W. Schmidt (Compositae) d NE (1.6%)  
*Urtica urens* L. (Urticaceae) d SAf  
*Urtica* spp. (Urticaceae) d I  
*Vaccinium varingiaefolium* Miq. (Ericaceae) b Io  
*Vallisneria spiralis* L. (Palmeae) b T

*Vanueria spinosa* Roxb. (Rubiaceae) (= *Meyna laxiflora*) c I (4.0%)  
*Villebrunea rubescens* Bl. (Urticaceae) a SEA  
*Viola abyssinica* Oliv. (Violaceae) d Af  
*Virecta procumbens* Sm. (Leguminosae) C

*Wedelia biflora* DC (Compositae) a SEA Po (3%)  
*Whitfordiodendron atropurpureum* Donn. (Leguminosae) a T B  
*Wormskjoeldia longipedunculata* Mast. (Turneraceae) Af

*Ximenia americana* L. (Olacaceae) b Io  
*Xy-molobium umbellatum* Ait. (Asclepiadiaceae) SAf

*Yucca arifolia* L. (Liliaceae) d CAM  
*Yucca elephantipes* Hort. (Liliaceae) d CAM (1.2%)

*Zantedeschia aethiopica* Spreng. (Araceae) (= *Richardia africana*) d Af  
*Zornia diphylla* Pers. (Leguminosae) Af  
*Zornia* spp. (Leguminosae) Af

### IIIc

*Acanthophoenix rubra* Wendl. Ré  
*Acrocomia mexicana* Karw. Me (2.4%)  
*Ancistrophoenix crinata* Wendl. Ré  
*Ancistrophyllum secundiflorum* Wendl. Af  
*Ancistrophyllum* spp. Af  
*Areca borneensis* Becc. SEA  
*Areca catechu* L. SEA (2.6-3.3%) 25)  
*Arenga ambong* Becc. Ph  
*Arenga engleri* Becc. Fo  
*Arenga pinnata* Merr. (= *A. saccharifera*) SEA (1.3%) 26, 27)  
*Arenga undulatifolia* Becc. Io 26)

*Borassus aethiopium* Mart. (= *B. flabellifer* var. *aethiopium*) Af 28, 29)  
*Borassus sundaica* Becc. (= *B. flabellifer* var. *sundaicum*) SEA I (2.7%) 23, 27)  
*Calamus burckianus* Becc. c SEA  
*Calamus deerratus* Mann. et Wendl. SL  
*Calamus tenuis* Roxb. c Io  
*Caryota mitis* Lour. SEA 26)  
*Caryota rumphiana* Mart. SEA 26)  
*Chamaedorea pacaya* Oerst. SAm  
*Chamaedorea* spp. CAM (4%)  
*Chamaerops humilis* L. NAF  
*Chrysalidocarpus ankaizinensis* Jum. Mg  
*Chrysalidocarpus auriculatus* Jum. Mg

*Chrysalidocarpus baronii* Becc. Mg  
*Chrysalidocarpus decipiens* Becc. Mg  
*Chrysalidocarpus fibrosus* Jum. Mg  
*Chrysalidocarpus mananjarensis* Jum. et Perr. Mg  
*Chrysalidocarpus oleraceus* Jum. et Perr. Mg  
*Chrysalidocarpus paucifolius* Jum. Mg  
*Cocos nucifera* L. P 27)  
*Corypha utan* Lam. (= *C. alata* Roxb. = *C. gebanga* Blume = *C. sylvestris* Mart.)  
SEA 27, 23, 26)

*Daemonorops calapparius* Bl. c Io  
*Daemonorops longipes* Mart. c Io  
*Daemonorops melanochaetes* Bl. c Io  
*Daemonorops oblongus* Bl. c Io  
*Daemonorops palembanicus* Bl. c Io 23)  
*Daemonorops periacanthus* Miq. c Io  
*Daemonorops ruber* Bl. c Io 23)  
*Dictyosperma album* Wendl. Ré  
*Didymosperma porphyrocarpum* Wendl. et Drude Io  
*Drymophloeus sexatilis* Mart. SAM  
*Dypsis gracilis* Bory Af

*Elaeis guireensis* Jacq. P 27)  
*Eugeissona insignis* Becc. Io 26)  
*Eugeissona utilis* Becc. Io 26, 30)  
*Euterpe longepetiolata* Oerst. SAM (2.2%)  
*Euterpe oleracea* Mart. SAM

*Geonoma edulis* H. Wendl. SAM (3.2%)  
*Gronophyllum microcarpum* Scheff. Io  
*Guilielma gasipaës* Bailey SAM

*Heterospathe elata* Scheff. Ph I  
*Heterospathe* spp. Ph  
*Hyphaene schatan* Boj. NAF  
*Hyphaene thebaica* Mart. NAF  
*Hyphaene ventricosa* Kirk. NAF

*Licuala* spp. M  
*Livistona australis* Mart. I  
*Livistona rotundifolia* Mart. Ph  
*Livistona saribas* Merr. Ph  
*Lodoicea callipyge* Comm. (= *L. sechellarum*) Af  
*Maximiliana maripa* Drude. SAM  
*Metroxylon sagu* Rottb. SEA 26)

*Neodypsis baronii* Jum. Mg  
*Neodypsis basilongus* Jum. et Perr. Mg  
*Neodypsis tanalensis* Jum. et Perr. Mg

*Oenocarpus baccaba* Mart. SAm  
*Oncosperma filamentosum* Bl. SEA 31)  
*Oncosperma horridum* Scheff. SEA  
*Oncosperma tigillarum* Ridl. (= *O. filamentosum*) M

*Phoenix dactylifera* L. P.  
*Phoenix reclinata* Jacq. Af  
*Pinanga punicea* Merr. SEA  
*Plectocomia elongata* Mart. c SEA

*Raphia pedunculata* P. Beauv. Af 28)  
*Roystonea oleracea* O. F. Cook (= *Oreodoxa oleracea*) P  
*Roystonea regia* O. F. Cook (= *Oreodoxa regia*) P

*Vonitra utilis* Jum. Af

### IIIb

*Acrostychnum aureum* L. (Polypodiaceae) j SEA  
*Alsophila glauca* J. Sm. (Cyatheaceae) m SEA (2.1%)  
*Angiopteris amboinensis* de Vr. (Marattiaceae) m Io  
*Aspidium repandum* Willd. (Polypodiaceae) (= *Tectaria crenata* Chev.) k SEA  
*Asplenium nidus* L. (Polypodiaceae) l P  
*Athyrium arnottii* (Polypodiaceae) SEA Pa

*Blechnum orientale* (Polypodiaceae) M  
*Blechnum* spp. (Polypodiaceae) Mg

*Cardiopteris lobata* Wall. (Ceratopteridaceae) M  
*Cardiopteris moluccanum* Blume (Ceratopteridaceae) Mo  
*Cardiopteris thalichroides* Brongn. (Ceratopteridaceae) (= *Ceratopteris thalichroides*  
Brongn. (Ceratopteridaceae)) j SEA Mg  
*Cibotium baranetz* J. Sm. (Cyatheaceae) m Io  
*Coniogramme fraxinea* Diels (Hymenophyllaceae) Fi  
*Cyclosorus cyatheoides* (Aspidiaceae) Pa  
*Cyclosorus dentata* Chinq. (Aspidiaceae) Fi

*Davallia denticulata* Mett. (Polypodiaceae) M C Mg  
*Dictyopteris irregularis* Presl. (Polypodiaceae) k SEA  
*Diplazium asperum* Bl. (Polypodiaceae) (= *Athyrium asperum*) k SEA

*Diplazium esculentum* Sw. (Polypodiaceae) (= *Athyrium esculentum*) j I SEA Po  
(1.6–3.7%)

*Diplazium proliferum* Thonars (Polypodiaceae) (= *Asplenium proliferum*) k SEA  
Mg

*Drynaria sparsisora* Moore (Polypodiaceae) k I Io

*Dryopteris leucopteris* Baker Fo

*Helmintostachys zeylanica* Hook. f. (Ophioglossaceae) k SEA (3.0–3.5%)

*Hemitelia latebrosa* Mett. (Cyatheaceae) m SEA

*Histiopteris sinuata* J. Sm. (Polypodiaceae) Fi

*Lygodium pedatum* Sw. (Schizaeaceae) (= *L. circinatum*) n SEA

*Lygodium scandens* Sw. (Schizaeaceae) n SEA

*Marsilea crenata* Presl. (Marsileaceae) SEA

*Marsilea minuta* L. (Marsileaceae) I Ce (3.3%)

*Marsilea quadrifolia* L. (Marsileaceae) I Ce (3.7%)

*Nephrolepis biserrata* Schott. (Polypodiaceae) k I SEA

*Nephrolepis hirsutula* Presl. (Polypodiaceae) k SEA

*Ophioglossum ovatum* Bory (Ophioglossaceae) Mg

*Ophioglossum reticulatum* L. (Ophioglossaceae) k SEA

*Ophioglossum sarcophyllum* Desv. (Ophioglossaceae) R

*Osmunda regalis* (Osmundaceae) NE

*Pleopeltis longistema* Moore (Polypodiaceae) j SEA

*Pleopeltis nigrescens* Carr. (Polypodiaceae) Bo

*Polypodium quercifolium* L. (Polypodiaceae) j I Ph

*Pteridium aquilinum* Kuhn (Polypodiaceae) Mg SL

*Pteris ensiformis* Burm. f. (Polypodiaceae) SEA

*Selaginella caudata* Spreng. (Selaginellaceae) SEA

*Selaginella fimbriata* Spreng. (Selaginellaceae) SEA

*Selaginella willdenowii* Baker (Selaginellaceae) n SEA

*Stenochlaena palustris* Bedd. (Polypodiaceae) n SEA Ph (2.4%)

*Stenochlaena tenuifolia* F. Didr. (Polypodiaceae) Af

*Tectaria crenata* Cav. (Aspidiaceae) Cf: *Aspidium repandum*

*Tectaria degeneri* Copel. (Aspidiaceae) Fi

*Tectaria latifolia* Copel. (Aspidiaceae) Fi

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## INDEX

- Akee apple: *Blighia sapida*  
 Alfalfa = Lucerne: *Medicago sativa*  
 Apple (Akee): *Blighia sapida*  
 Apple (Malay): *Eugenia malaccensis* = *Syzygium malaccensis*  
 Apple (Otaheite): *Spondias cytherea* = *Spondias dulcis*  
 Arrowhead: *Sagittaria sagittifolia*  
 Arrowroot (Bermuda): *Maranta arundinacea*  
 Arrowroot (Purple): *Canna edulis*  
 Artichoke = Cardoon: *Cynara* spp.  
 Artichoke (Jerusalem): *Helianthus tuberosus*  
 Ash pumpkin = White gourd = Wax gourd: *Benincasa hispida* = *Benincasa cerifera*
- Bambara groundnut: *Voandzeia subterranea*  
 Bamboo: *Bambusa* spp., *Dendrocalamus* spp., *Gigantochloa* spp., *Phyllostachyum* spp., *Schizostachyum* spp., *Oxytenanthera* spp.  
 Bamboo (Water) = Wild rice: *Zizania latifolia*  
 Banana = Plantain: *Musa acuminata*, *M. balbisiana*  
 Basil (Sweet): *Ocimum basilicum*  
 Beal fruit: *Aegle marmelos*  
 Bean (Adzuki): *Phaseolus angularis*  
 Bean (Bonavist) = Hyacinth bean: *Dolichos lablab* = *Lablab vulgaris*  
 Bean (Broad): *Vicia faba*  
 Bean (Cluster) = Guar: *Cyamopsis psoraloides* = *C. tetragonolobus*  
 Bean (Four-angled) = Goa bean = Winged bean: *Psophocarpus tetragonolobus*  
 Bean (French) = Kidney bean: *Phaseolus vulgaris*  
 Bean (Goa) = Four-angled bean = Winged bean: *Psophocarpus tetragonolobus*  
 Bean (Hyacinth) = Bonavist bean: *Dolichos lablab* = *Lablab vulgaris*  
 Bean (Jack) = Sword bean: *Canavalia ensiformis*  
 Bean (Kidney) = French bean: *Phaseolus vulgaris*  
 Bean (Lima) = Sieva bean: *Phaseolus lunatus*  
 Bean (Mauritius) = Velvet bean: *Mucuna utilis* = *Stizolobium utile*  
 Bean (Mung) = Black gram: *Phaseolus mungo*  
 Bean (Potato) = Yam bean: *Pachyrrhizus erosus* = *P. bulbosus*, *P. angulatus*  
 Bean (Rice): *Phaseolus calcaratus*  
 Bean (Sieva) = Lima bean: *Phaseolus lunatus*  
 Bean (Sword) = Jack bean: *Canavalia ensiformis*  
 Bean (Velvet) = Mauritius bean: *Mucuna utilis* = *Stizolobium utile*  
 Bean (Winged) = Goa bean = Four-angled bean: *Psophocarpus tetragonolobus*  
 Bean (Yam) = Potato bean: *Pachyrrhizus erosus* = *P. bulbosus*, *P. angulatus*  
 Beet (Garden) = Beetroot: *Beta vulgaris* forma *rubra*  
 Beet (Spinach) = Swiss chard: *Beta vulgaris* forma *cicla*  
 Beetroot = Garden beet. *Beta vulgaris* forma *rubra*  
 Betel nut: *Areca catechu*  
 Bird of paradise: *Heliconia brevispatha*  
 Bitter leaf: *Vernonia amygdalina*  
 Borecole = Curly greens = Kale: *Brassica oleracea* var. *acephala* forma *sabellica*  
 Breadfruit: *Atrocarpus communis* = *A. altitilis* = *A. incisa*  
 Breadfruit (African): *Treculia africana*

Breadnuttree: *Brosimum alicastrum*  
 Brussels sprouts: *Brassica oleracea* var. *bullata* forma *gemmifera*  
 Buckwheat: *Fagopyrum tataricum*

Cablage (Chinese, Shantung) = Petsai: *Brassica chinensis* = *B. napus* var. *chinensis*  
 Cabbage (Drumhead, Drum): *Brassica oleracea* var. *capitata*  
 Cabbage (Savoy): *Brassica oleracea* var. *bullata* forma *sabauda*  
 Cabbage (Shantung, Chinese) = Petsai: *Brassica chinensis* = *B. napus* var. *chinensis*  
 Cabbage (Swamp) = Water spinach: *Ipomoea reptans*  
 Calathea: *Calathea macrosepala*  
 Cantaloupe = Musk melon: *Cucumis melo*  
 Caraway: *Carum involucreatum*  
 Cardoon = Artichoke: *Cynara* spp.  
 Carrot: *Daucus carota*  
 Cashew: *Anacardium occidentale*  
 Cassava = Manioc = Tapioca: *Manihot utilissima* = *M. esculenta*  
 Castor oil plant: *Ricinus communis*  
 Cherry (Peruvian) = Husk tomato = Ground tomato = Cape Gooseberry: *Physalis peruviana*  
 Chocho = balsam pear: *Sechium edule*  
 Cock's comb: *Celosia* spp.  
 Cocoyam = Dasheen = Taro: *Colocasia esculenta* = *C. antiquorum*  
 Collards: *Brassica oleracea* var. *acephala* forma *viridis*  
 Coriander: *Coriandrum sativum*  
 Corn (Sweet) = Maize: *Zea mays* var. *rugosa*  
 Cowpea: *Vigna unguiculata* = *V. sinensis*  
 Cress (Garden): *Lepidium sativum*  
 Cress (Upland): *Barbarea verna* = *B. praecox*  
 Croton: *Codiaeum variegatum*  
 Cucumber = Gherkin: *Cucumis sativus*  
 Cucumber (Anguria) = West Indian Gherkin: *Cucumis anguria*  
 Cucumber (Bitter): *Momordica charantia*  
 Cucumber tree: *Averrhoa bilimbi*  
 Curly greens = Borecole = Kale: *Brassica oleracea* var. *acephala* forma *sabellica*  
 Curry: *Murraya koenigii*

Dandelion: *Taraxacum officinale*  
 Dasheen = Cocoyam = Taro: *Colocasia esculenta* = *C. antiquorum*  
 Date (Desert): *Balanites aegyptica*  
 Dill: *Anethum graveolens*  
 Drumstick tree = Horseradish tree: *Moringa oleifera*  
 Durian: *Durio zibethinus*

Egg plant: *Solanum melongena* = *S. esculentum* = *S. incanum*  
 Elephant foot: *Amorphophallus campanulatus*  
 Elephant grass: *Pennisetum purpureum*  
 Elephant yam: *Dioscorea* spp.  
 Endive: *Cichorium endivia*

Fennel: *Foeniculum dulce* = *F. vulgare*  
 Fenugreek: *Trigonella foenum-graecum*  
 Fir (joint): *Gnetum gnemon*

Galangal (Greater): *Alpinia galanga*  
 Garlic: *Allium sativum*  
 Gherkin = Cucumber: *Cucumis sativus*  
 Gherkin (West Indian) = Anguria cucumber: *Cucumis anguria*  
 Gimgelly = Sesame: *Sesamum orientale* = *S. indicum*  
 Ginger: *Zingiber officinale*  
 Gombo = Lady Fingers = Okra: *Hibiscus esculentus* = *Abelmoschus esculentus*  
 Gooseberry (Cape) = Ground tomato = Husk tomato = Peruvian cherry: *Physalis peruviana*

Gourd = Pumpkin = Squash = Vegetable marrow = Chinese pumpkin: *Cucurbita moschata*, *C. maxima*, *C. pepo*  
 Gourd (Bottle): *Lagenaria leucantha* = *L. siceraria*  
 Gourd (Fluted): *Telfairia occidentalis*  
 Gourd (Ivy) = Small gourd: *Coccinia cordifolia* = *C. indica* = *Cephalandra indica*  
 Gourd (Ridged) = Loofah = Sponge gourd: *Luffa acutangula* = *L. aegyptiaca*, *L. cylindrica*  
 Gourd (Small): Ivy gourd: *Coccinia cordifolia* = *C. indica* = *Cephalandra indica*  
 Gourd (Snake): *Trichosantes anguina*  
 Gourd (Sponge) = Ridged gourd = Loofah: *Luffa acutangula* = *L. aegyptiaca*, *L. cylindrica*  
 Gourd (Wash, White) = Ash pumpkin: *Benincasa hispida* = *B. cerifera*  
 Gram (Black) = Mung bean: *Phaseolus mungo*  
 Gram (Golden) = Green gram: *Phaseolus aureus* = *Ph. radiatus*  
 Gram (Red) = Pigeon pea = Angola pea = Congo pea: *Cajanus cajan* = *C. indicus*  
 Grape (Wine): *Vitis vinifera*  
 Grass (Elephant): *Pennisetum purpureum*  
 Grass pea = Chickling vetch: *Lathyrus sativus*  
 Groundnut (Bambara): *Voandzeia subterranea*  
 Guar = Cluster bean: *Cyamopsis psoraloides* = *C. tetragonolobus*

Hemp: *Cannabis sativa*  
 Hibiscus (Sunset): *Hibiscus manihot* = *Abelmoschus manihot*  
 Horse radish: *Armoracia lapathifolia*  
 Horseradish tree = Drumstick tree: *Moringa oleifera*  
 Horse tamarind = Lead tree: *Leucaena glauca*

Jack tree: *Atrocarpus integra* = *A. integrifolia* = *A. heterophylla*  
 Joint fir: *Gnetum gnemon*  
 Jute: *Corchorus* spp. (mainly *C. capsularis*)

Kale = Borecole = Curly greens: *Brassica oleracea* var. *acephala* forma *sabellica*  
 Kale (Sea): *Grambe maritima*  
 Kapok tree: *Ceiba pentandra*  
 Kardi = Safflower: *Carthamus tinctorius*  
 Kohlrabi = Knol-Knol: *Brassica oleracea* var. *gongyloides* et var. *caulorapa*  
 Kudzu: *Pueraria thunbergiana* = *P. lobata*

Lady fingers = Gombo = Okra: *Hibiscus esculentus* = *Abelmoschus esculentus*  
 Lead tree = Horse tamarind: *Leucaena glauca*  
 Leaf (Bitter): *Vernonia amygdalina*  
 Leaf (Water) = Philippine spinach = Ceylon spinach: *Talinum triangulare*  
 Leek: *Allium porrum*  
 Lettuce: *Lactuca sativa*  
 Loofah = Ridged gourd = Sponge gourd: *Luffa acutangula* = *L. aegyptiaca*, *L. cylindrica*  
 Lotus: *Nelumbo nelumbo* = *N. nuciferum* = *N. speciosum* = *N. indica*  
 Lucerne = Alfalfa: *Medicago sativa*  
 Lupin: *Lupinus albus*

Maize = Sweet corn: *Zea mays* var. *rugosa*  
 Mallow (Egyptian): *Malva parviflorum*  
 Mallow (Musk): *Hibiscus abelmoschus* = *Abelmoschus moschatus*  
 Mango: *Mangifera indica*  
 Manioc = Cassava = Tapioca: *Manihot utilissima* = *M. esculenta*  
 Marrow (Vegetable) = Gourd = Pumpkin = Squash = Chinese pumpkin: *Cucurbita moschata*, *C. maxima*, *C. pepo*  
 Marygold: *Mesembryanthemum angulatum*  
 Melon (Musk) = Cantaloupe: *Cucumis melo*  
 Melon (Water): *Citrullus vulgaris* = *C. lanatus*  
 Millet (African) = Finger millet: *Eleusine coracana*  
 Mint: *Mentha javanica*  
 Mugwort: *Artemisia vulgaris*  
 Mulberry: *Morus alba*  
 Mulberry (Polynesian): *Broussonetia papyrifera*

Musk melon = Cantaloupe: *Cucumis melo*  
Mustard (Black) = True Mustard: *Brassica nigra*  
Mustard (Chinese) = Indian mustard: *Brassica juncea*  
Mustard (Indian) = Chinese mustard: *Brassica juncea*  
Mustard (True) = Black mustard: *Brassica nigra*  
Mustard (White): *Sinapsis alba*

Naseberry = Chico: *Achras sapota*  
Neem: *Azadirachta indica* = *Melia azadirachta* = *Antelia azadirachta*  
Nightshade (Black) = Wonderberry: *Solanum nigrum*  
Nightshade (Malabar) = Ceylon spinach = Indian spinach = Vine spinach: *Basella alba*,  
*B. rubra* = *B. cordifolia*  
Nut (Tiger): *Cyperus esculentus*

Okra = Gombo = Lady fingers: *Hibiscus esculentus* = *Abelmoschus esculentus*  
Onion: *Allium cepa*  
Onion (Welsh): *Allium fistulosum*  
Oyster plant (Spanish) = Golden thistle: *Scolymus hispanicus*  
Ozach = Salt bush: *Atriplex hortensis*

Palm (Coconut): *Cocos nucifera*  
Palm (Oil): *Elaeis guineensis*  
Palm (Palmyra): *Borassus aethiopicum*  
Palm (Sugar): *Arenga pinnata*  
Palmyra palm: *Borassus aethiopicum*  
Papaw: *Carica papaya*  
Parsley: *Petroselinum vulgare*  
Parsnip (Peruvian): *Arracacia xanthorrhiza* = *A. esculenta*  
Pea = Field pea: *Pisum sativum*, *P. arvense*  
Pea (Angola) = Pigeon pea = Congo pea = Red gram: *Cajanus cajan* = *C. indicus*  
Pea (Asparagus) = Winged pea: *Lotus edulis* = *L. tetragonolobus*  
Pea (Chick): *Cicer arietinum*  
Pea (Congo) = Pigeon pea = Angola pea = Red gram: *Cajanus cajan* = *C. indicus*  
Pea (Field) = Pea: *Pisum sativum*, *P. arvense*  
Pea (Pigeon) = Angola pea = Congo pea = Red gram: *Cajanus cajan*, *C. indicus*  
Pea (Winged) = Asparagus pea: *Lotus edulis* = *L. tetragonolobus*  
Peanut: *Arachis hypogaea*  
Pear (Balsam) = Chocho: *Sechium edule*  
Pear (Melon) = Peruvian pepeno: *Solanum muricatum*  
Pepper (Red) = Chillies: *Capsicum* spp.  
Perilla: *Perilla frutescens*  
Petsai = Chinese cabbage = Shantung cabbage: *Brassica chinensis* = *B. napus* var. *chinensis*  
Pigweed: *Chenopodium album*  
Pine-apple: *Ananas comosus*  
Plantain = Banana: *Musa acuminata*, *M. balbisiana*  
Poinsettia: *Euphorbia pulcherrima*  
Potato (Irish): *Solanum tuberosum*  
Potato (Sweet): *Ipomoea batatas*  
Pumpkin = Gourd = Squash = Vegetable marrow = Chinese pumpkin: *Cucurbita moschata*, *C. maxima*, *C. pepo*  
Purslane: *Portulaca* spp.  
Purslane (Winter): *Claytonia perfoliata* = *Montia perfoliata*

Radish (Chinese): *Raphanus sativus* var. *hortensis* = *Rh. raphanistroides* var. *pinnatifida* = *Rh. raphanistroides* var. *longipinnatus*  
Radish (Horse): *Armoracia lapathifolia*  
Ramie: *Boehmeria nivea*  
Rhubarb: *Rheum hybridum* = *Rh. rhabarbarum* × *Rh. raponticum*  
Rice (Wild) = Water bamboo: *Zizania latifolia*  
Rocket (Garden): *Eruca sativa*  
Rose: *Rosa* spp.  
Roselle: *Hibiscus sabdariffa*

Runner (Scarlet): *Phaseolus multiflorus* = *Ph. coccineus*  
Rutabaga = Swede: *Brassica napus* = *B. napus* var. *napobrassica*

Safflower = Kardi: *Carthamus tinctorius*  
Sago: *Metroxylon sagu*  
Salad (Corn): *Valerianella olitoria*  
Salsify: *Tragopogon porrifolius*  
Salsify (Beach): *Scorzonera hispanica*  
Salt bush = Ozach: *Atriplex hortensis*  
Sesame = Gimgelly: *Sesamum orientale* = *S. indicum*  
Shallot: *Allium ascalonicum*  
Sorrel: *Rumex abyssinicus*  
Soursop: *Annona muricata*  
Soybean: *Glycine max*  
Spinach: *Spinacia oleracea*  
Spinach (Ceylon) = Philippine spinach = Water leaf: *Talinum triangulare*  
Spinach (Ceylon) = Indian spinach = Vine spinach = Malabar nightshade: *Basella alba*,  
*B. rubra* = *B. cordifolia*  
Spinach (Indian) = Vine spinach = Ceylon spinach = Malabar nightshade: *Basella alba*,  
*B. rubra* = *B. cordifolia*  
Spinach (New Zealand): *Tetragonia expansa*  
Spinach (Philippine) = Ceylon spinach = Water leaf: *Talinum triangulare*  
Spinach (Vine) = Ceylon spinach = Indian spinach = Malabar nightshade: *Basella alba*,  
*B. rubra* = *B. cordifolia*  
Spinach (Water) = Swamp cabbage: *Ipomoea reptans*  
Sprouts (Brussels): *Brassica oleracea* var. *bullata* forma *gemmifera*  
Squash = Gourd = Pumpkin = Vegetable marrow = Chinese pumpkin: *Cucurbita moschata*, *C. maxima*, *C. pepo*  
Swede = Rutabaga: *Brassica napus* = *B. napus* var. *napobrassica*

Tacaco: *Polakowskia tacaco*  
Tamarind: *Tamarindus indica*  
Tamarind (Horse) = Lead Tree: *Leucaena glauca*  
Tania = Yautia: *Xanthosoma violaceum* = *X. sagittifolium*, *X. brasiliense*, *X. mafaffa*, *X. caraca*,  
*X. albertii*, *X. jacquini*  
Tapioca = Cassava = Manioc: *Manihot utilissima* = *M. esculenta*  
Taro = Cocoyam = Dasheen: *Colocasia esculenta* = *C. antiquorum*  
Tarragon: *Artemisia dracunculus*  
Thistle (Golden) = Spanish oyster plant: *Scolymus hispanicus*  
Thyme: *Thymus vulgaris*  
Tiger nut: *Cyperus esculentus*  
Tomato: *Solanum lycopersicum* = *Lycopersicon esculentum*  
Tomato (Husk) = Ground tomato = Cape gooseberry = Peruvian cherry: *Physalis peruviana*  
Tomato (Tree): *Cyphomandra betacea*  
Tree tomato: *Cyphomandra betacea*  
Turmeric: *Curcuma longa* = *C. domestica*  
Turnip: *Brassica rapa* = *B. campestris* var. *rapa*

Vetch (Chickling) = Grass pea: *Lathyrus sativus*

Watercress: *Nasturtium officinale* = *Roripa nasturtium*  
Water melon: *Citrullus vulgaris* = *C. lanatus*  
Water leaf = Philippine spinach = Ceylon spinach: *Talinum triangulare*  
Waterlily: *Nymphaea lotus*  
Wonderberry = Black nightshade: *Solanum nigrum*

Yam (Elephant): *Dioscorea* spp.  
Yautia = Tania: *Xanthosoma violaceum* = *X. sagittifolium*, *X. brasiliense*, *X. mafaffa*, *X. caraca*,  
*X. albertii*, *X. jacquini*

Zeodary: *Zingiber zerumbet*